Tektronix®

COMMITTED TO EXCELLENCE

670A & 671A

COLOR PICTURE MONITORS

INSTRUCTION MANUAL

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TEKTRONIX®

670A & 671A

COLOR PICTURE MONITORS

INSTRUCTION MANUAL

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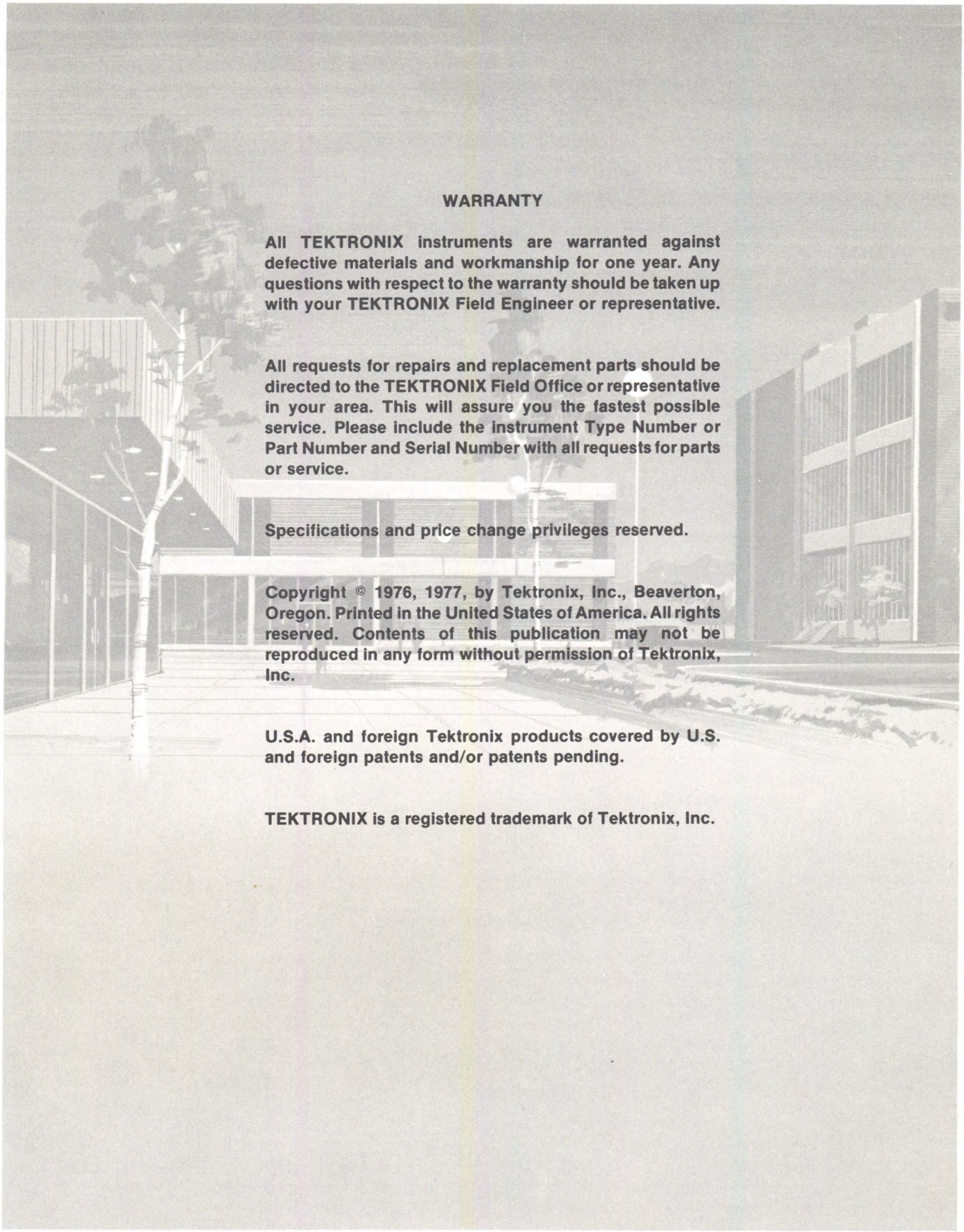

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All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repairs and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

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WARNING

THE REMAINING PORTION OF THIS TABLE OF CONTENTS LISTS THE SERVICING AND INSTALLATION INSTRUCTIONS. THESE INSTRUCTIONS ARE INTENDED FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT INCLUDED IN THE OPERATOR'S INFORMATION PART OF THIS MANUAL UNLESS YOU ARE QUALIFIED TO DO SO.

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CHANGE INFORMATION

Fig. 1-1. The 670A NTSC Color Picture Monitor. Other 670A-Series Monitors appear similar to this instrument except for slight control changes made to right front panel and different model designation in lower left panel.

PART I
OPERATOR'S INFORMATION

This manual is divided into two parts. Part I is intended for use by operating and service personnel. Part II is to be used by qualified service personnel only, since servicing exposes personnel to hazardous voltages.

INTRODUCTION

Safety Summary

This portion of the manual contains safety information which the operator and service technician must follow to avoid hazardous voltages to ensure safe operation of this instrument.

WARNING information in this manual is intended to protect personnel from hazardous voltages.

CAUTION information is intended to protect the instrument from damage.

The following are general safety precautions that must be observed during all phases of operation.

WARNING

To reduce the electrical shock hazard, the instrument chassis must be properly grounded. Refer to the following for more information.

The 670A-Series Color Picture Monitor operates from a single-phase power source with one of the current-carrying conductors (neutral conductor) at ground (earth) potential. Operation from power sources where both current-carrying conductors are live with respect to ground (such as phase-to-phase on a 3-wire system) is not recommended, since only the line conductor has overcurrent (fuse) protection within the instrument.

The color monitor has a 3-wire cord with a 3-terminal polarized plug for connection to the power source and earth ground. The earth ground terminal of the plug is directly connected to the metal parts of the instrument. For electric-shock protection, insert the power plug in a mating outlet with an earth ground contact.

If a 3- or 2-wire adapter is used to connect the color monitor to a 2-wire ac power system, be sure to connect the ground lead of the adapter to a conductor that connects to earth ground. Failure to complete the grounding system may allow the metal parts of this instrument to be elevated above ground potential and create a shock hazard.

WARNING

Electrical shock hazards are present inside this instrument. Only qualified service personnel should remove the instrument cover.

Damage Inspection

After carefully removing the picture monitor from the shipping carton, inspect the instrument for possible damage incurred during shipment. Report any shortage or damage to the carrier.

Accessories List

A list of the standard accessories supplied with this instrument can be found on the last page of the Replaceable Mechanical Parts list illustrations. For additional accessories, see the current Tektronix, Inc. Television Products Catalog.

OPERATING INSTRUCTIONS

Product Description

The TEKTRONIX 670A-Series Color Television Picture Monitors are compact instruments that utilize a 17-inch, 90° Trinitron® picture display kinescope. Screen size is approximately 136 square inches (880 square cm) with an aspect ratio of 3:4.

Several unique features in addition to the Trinitron® kinescope set the instrument aside from other picture monitors intended for professional use in broadcast, closed circuit, industrial, and educational fields.

Two inputs are provided for encoded video signals. Each input can be isolated from the chassis to prevent ground-current induced hum. Each input is also isolated from all others. Hum is at least 50 dB down for up to 4 V rms mains hum signal.

The picture may be shifted either horizontally or vertically or both together (pulse cross). This permits monitoring sync, burst, blanking, vertical interval test and reference signals. When the monitor is operating in any of these shifted-display modes, brightness is automatically advanced to permit observing the sync pulses. Expansion of the vertical scan is provided in pulse cross and vertical delay to view individual lines in the vertical blanking interval.

Two external composite sync inputs are provided with the capability of automatically switching between two external sync signal sources as the video input is switched, or for obtaining sync for both video inputs from one sync source. The sync inputs are also isolated from each other and the chassis.

The color monitor is a calibrated measuring instrument. Chrominance gain and phase (hue) controls, video gain, contrast, and brightness controls are all provided with preset detent positions. In these positions the instrument produces a picture in accordance with system standards.

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Residual color subcarrier, present as a cw signal component of the encoded signal, causes a change in the colorimetry of the reproduced picture on home receivers. This occurs because the cw subcarrier is present on neutral shades of gray and white. Even subcarrier amplitudes too small to be easily noticed on the waveform monitor or vectorscope can change the observed color. The 670A-Series Monitors are designed to detect residual subcarrier signal under these conditions and will display a significantly different color picture in certain cases than other monitors. This feature may be eliminated if desired. However, as a measuring instrument, it is intended to display the true signal, and not compensate for signal errors.

When monitoring color signals, it is essential that the chrominance subcarrier does not reach the kinescope. If it does, the effects are as follows:

1. Objectionable dot structure crawling vertically.

2. Gamma characteristics of the display will be altered by the chrominance subcarrier. The result is that highly saturated areas, especially dark areas, will be substantially increased in brightness with a consequent decrease in saturation and contrast.

A practical solution is to reduce the luminance amplifier frequency response in the vicinity of the color subcarrier. A luminance channel low-pass filter with phase equalization is provided to accomplish this objective.

The MODE switch controls whether or not the chrominance channel is activated. In the AUTO mode, the chrominance channel is activated by the presence of burst. In the COLOR mode, the chrominance channel is activated whether burst is present or not; in B & W (Black and White) mode, the channel is deactivated despite the presence of burst.

In NTSC and PAL color monitors, the color subcarrier is regenerated from burst with great accuracy, despite the many possible errors which may occur in burst itself with regard to timing, amplitude or transients (quadrature components). Burst itself is often regenerated in TV transmission; hence, this instrument should not exhibit any sensitivity to the peculiarities of the color burst component of the picture signal.

Picture sharpness in the 670A-Series Monitor is enhanced by variable-aperture correction in the luminance channel, which provides improved resolution. You can choose the amount of correction desired with a continuously-variable front-panel control or use a preset position for "no correction" operation.

The Sony Corporation Trinitron® kinescope has many advantages over currently available shadow mask color picture tubes. Outstanding among them is the simplicity of its convergence adjustment. After the yoke has been positioned properly, convergence is adjusted by means of four front-panel controls located behind a lockable door. Not only are there far fewer controls, but their operation is much simpler. Basic to the Trinitron® gun is the arrangement of the red and blue cathodes on the same (horizontal) plane as the green cathode which is located on the kinescope axis between the red and blue cathodes. Thus, convergence is primarily a matter of modulating the horizontal deflection component of the red and blue beams in opposite manner, but nearly equal amounts. The green beam, being on axis, is not affected by convergence adjustments. Since the eye perceives green best, the green cathode is located in the center, which affords it the best focus of all three beams.

Reference white for the monitor is illuminant D, whose color temperature is approximately 6500° K. The monitor is calibrated at the time of manufacture using a white comparator. Since the screen color temperature is highly critical in accurate color reproduction and does vary with aging of the picture tube, regardless of design, this parameter cannot be guaranteed. Slight differences in color temperature between various monitors in a given broadcasting facility are far more serious than an absolute error in color temperature of all monitors at that facility. Thus, each facility will desire to maintain all monitors to match the same reference white standard that is used at the facility.

The kinescope operates at 24 kV from a regulated EHT (Extremely High Tension) supply which is interlocked with the horizontal and vertical deflection circuits to avoid possible damage to the picture tube in the event of a deflection failure.

During an EHT current-overload condition, certain calibrated characteristics of the monitor are altered; therefore, a front-panel OVERLOAD indicator is provided.

All components in the instrument are solid state except for the kinescope. All transistors and diodes are silicon devices. Most transistors and integrated circuits are socketed for ease in servicing. Semi-modular construction is used with the glass-epoxy etched circuit boards readily removable for repair or replacement.

Mains Operating Voltage

Before connecting the instrument to a power source (also referred to as the "mains"), be sure to look at the rear panel to find the operating voltage for which the instrument has been set (see Fig. 2-1).

CAUTION

You can damage the picture monitor if you operate it from a 230 V ac line voltage when the instrument has been set for 115 V ac operation.

Any changes must be made by qualified service personnel only. Instructions for changing the operating voltage and fuse are provided in Part II—Service & Installation portion of this manual.

Rear Panel Fuse Replacement

WARNING

Disconnect the picture monitor from the power source before checking or replacing the rear-panel fuse.

If you need to replace the fuse for the mains operating voltage used and for which the picture monitor is set, be sure to use the correct fuse for continued fire protection. Refer to the Replaceable Electrical Parts list for fuse data.

FUNCTION OF FRONT-PANEL CONTROLS & LIGHTS

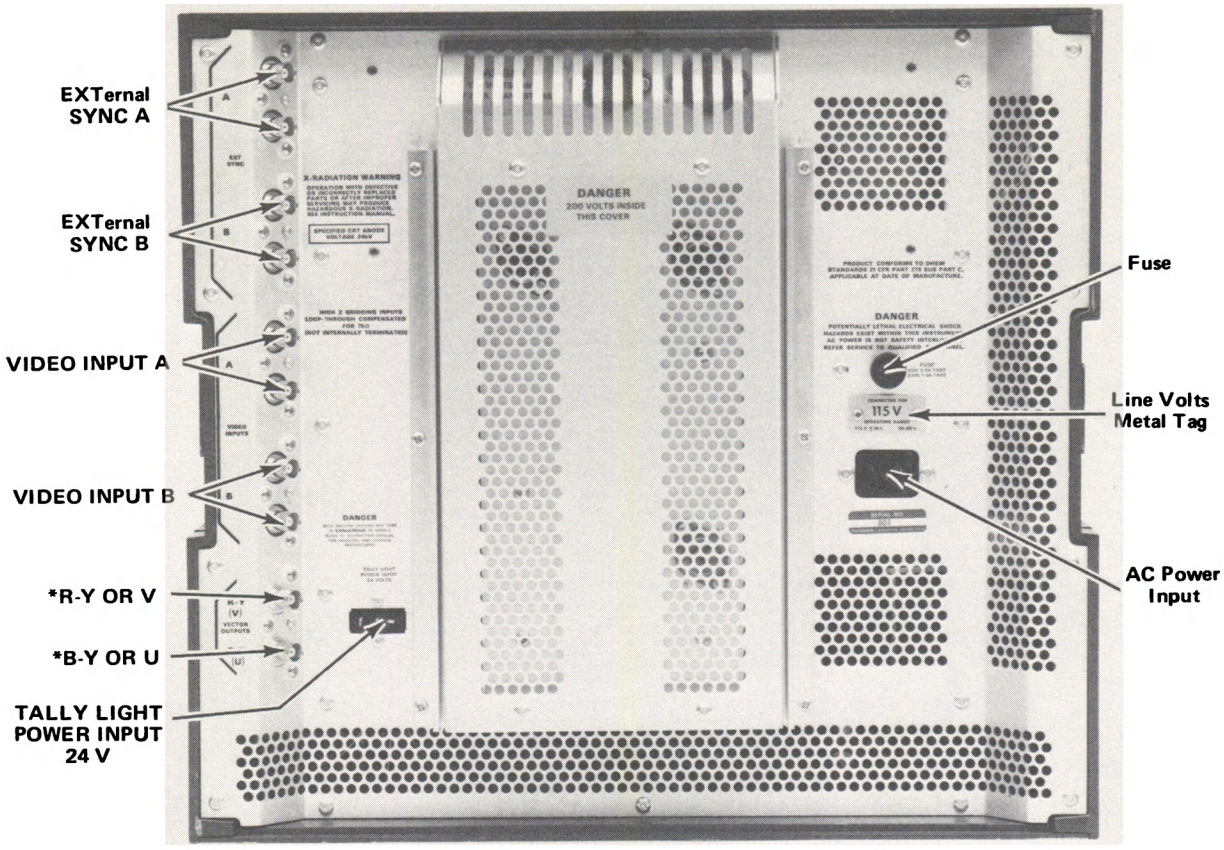
The following is a brief description of the operation or function of the front-panel controls and lights (see Figures 2-2 and 2-3).

Upper Top Center Front-Panel Light

Tally Light	Two series-connected 14 V incandescent lamps that are remotely powered through a 24 V rear-panel connector.

Left Front-Panel Controls (located behind a lockable door)

VERTICAL CENTER	Controls vertical position of the display.
HORIZONTAL CENTER	Controls horizontal position of the display.



*Demodulated Chroma Output Connector (Option 2).

Fig. 2-1. Rear panel view of the picture monitor.

VERTICAL SIZE — Provides adjustment of picture height.

HORIZONTAL SIZE — Provides adjustment of picture width.

CONVERGENCE

STATIC — Two adjustments (vertical and horizontal) for convergence of the display in the center screen area.

TILT — Two adjustments (vertical and horizontal) for convergence of the display outside of the center screen area.

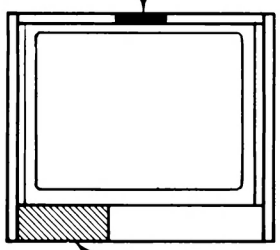
VERT SCAN — A two-position slide switch.
NORMAL: Provides normal vertical scan operation.
SETUP: Reduces vertical scan to 10% of full size to facilitate checking and adjusting kinescope low-light color temperature.

RED, GREEN, and BLUE SCREENS — The following switches and adjustments facilitate checking and adjusting gray scale tracking:
ON-OFF—Allows the appropriate beam to be turned on or off.
BIAS—Kinescope adjustments for low-light color temperature.
GAIN—Red and blue kinescope adjustments for high-light color temperature. (Green gain is set by the Contrast Preset adjustment. This is an internal adjustment and should be performed by a qualified service technician.)

R, G, and B spaces — Two blank rectangular spaces for each primary color, located near the left side of the left front panel. TEKTRONIX J16 Digital Photometer low- and high-light readings for each beam can be recorded in these spaces.

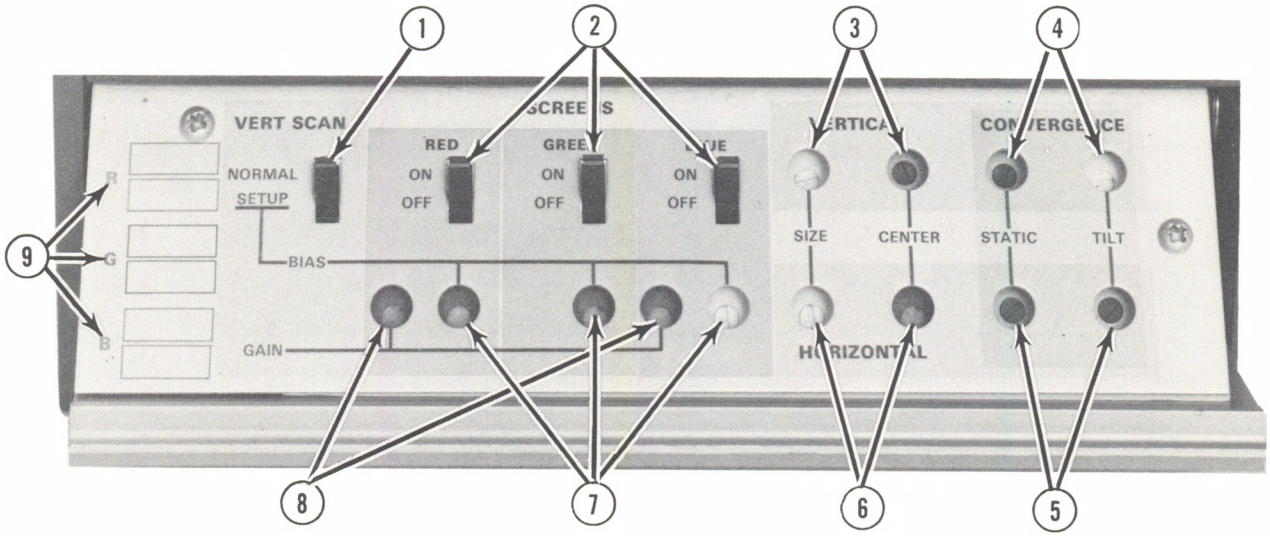
Tally Light

Two series-connected 12 V lamps that are remotely powered through a 24 V rear panel connector.



LEFT FRONT PANEL ADJUSTMENTS

(Located behind this lockable tilt-out panel)



(1) VERT SCAN—Selects either normal vertical size display or vertical size reduced to 10% of normal for color temperature set-up.

(2) SCREENS—ON-OFF slide switches to turn red, green, or blue beam(s) on or off.

(3) VERTICAL—SIZE adjusts vertical height of picture. CENTER adjusts vertical centering of picture.

(4) CONVERGENCE (VERTICAL) STATIC—adjusts convergence of center area of display. TILT—adjusts convergence outside of the center area of the display.

(5) CONVERGENCE (HORIZONTAL) STATIC and TILT—adjust convergence in same manner as VERTICAL.

(6) HORIZONTAL—SIZE adjusts horizontal width of picture. CENTER adjusts horizontal centering of picture.

(7) BIAS—Kinescope adjustments for setting intensity of red, green, and blue beams for low light color temperature.

(8) GAIN—Red and Blue kinescope gain adjustments for high light color temperature. (Green gain is set by the Contrast Preset adjustment).

(9) Spaces for recording low and high light readings (from a TEKTRONIX J16 Digital Photometer.

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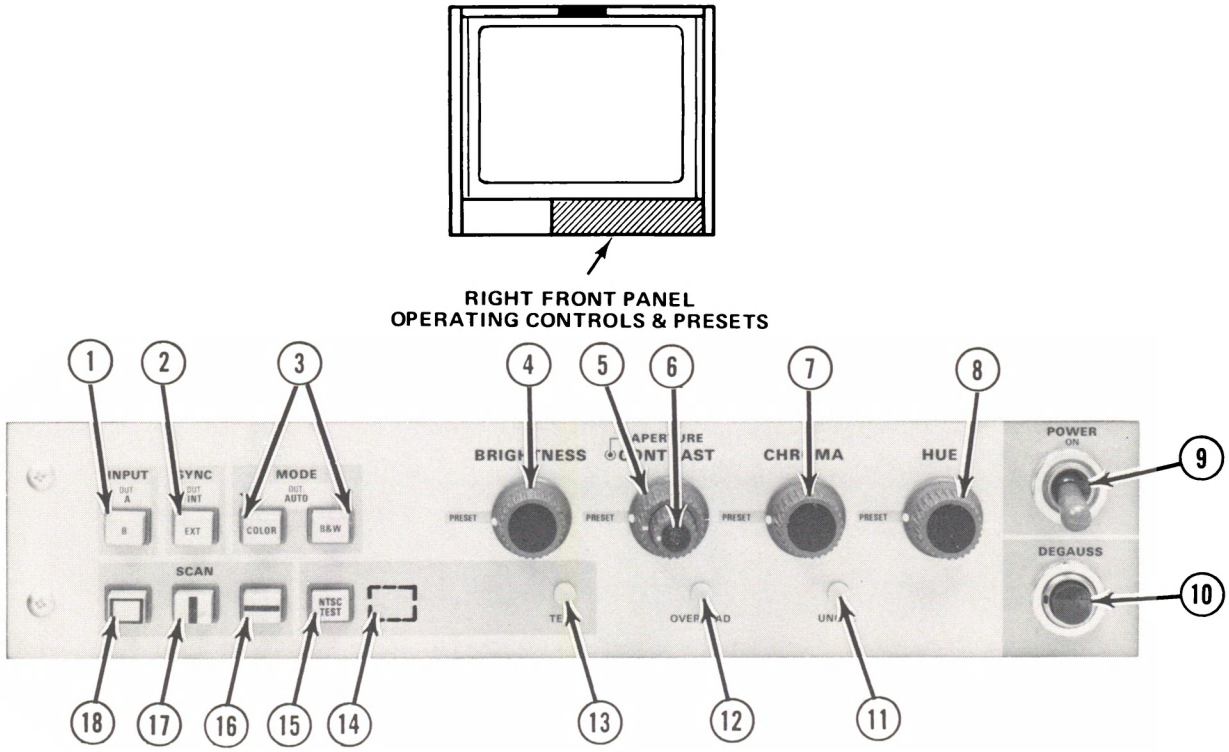
Fig. 2-2. Left front-panel controls and adjustments.



(1) **INPUT**—Selects source of video input signals. 'Out' for CH A; 'In' for CH B.

(2) **SYNC**—Selects source of synchronizing signal. 'Out' for INTernal; 'In' for EXTernal.

(3) **MODE**—Two pushbuttons for selecting three operating modes:

AUTO—Automatic color mode; selected by leaving COLOR and B&W pushbuttons out.

COLOR—Selected by depressing COLOR pushbutton only.

B&W—(Black & White mode); selected by depressing B&W pushbutton only.

(4) **BRIGHTNESS**—Sets brightness level of the picture.

(5) **CONTRAST**—Sets contrast level of the picture.

(6) **APERTURE**—Provides variable amount of mid-frequency boost to the luminance channel to enhance picture sharpness. (Concentric with CONTRAST control).

(7) **CHROMA**—Sets color saturation of picture.

(8) **HUE**—(670A only)—Controls hue or phase angle of the demodulated subcarrier signal, setting tint of picture.

(9) **POWER**—Connects or interrupts ac power applied to the instrument.

(10) **DEGAUSS**—Pushbutton to demagnetize metal parts of the picture tube.

(11) **UNCAL Lamp**—Illuminates brightly when the CONTRAST, HUE, or CHROMA controls are not in PRESET position, and when Horiz Delay or Vert Delay pushbuttons are pressed in.

Illuminates dimly when the BRIGHTNESS control is not set to PRESET.

(12) **OVERLOAD Lamp**—Illuminates whenever the kinescope overdrive protection circuit is in operation.

(13) **TEST Lamp**—Illuminates when the NTSC TEST (670A) or DEMOD TEST or SIMPL-DLX (671A) pushbutton is depressed.

(14) **DEMOD TEST (671A only)**—Same function as NTSC TEST pushbutton, except modifies PAL Decoder.

(15) **NTSC TEST (670A) or SIMPL-DLX (671A)**—'Out' position modifies matrix in NTSC Decoder to compensate for color errors.

'In' position returns matrix to strict NTSC values.

(16) **SCAN Vert Delay**—'In' position displays vertical sync in center of screen with increased brightness. 2.5X vertical expansion with SIZE pushbutton set to FULL.

(17) **SCAN Horiz Delay**—'In' position displays horizontal sync in left one-third of screen with increased brightness.

(18) **SCAN Size**—'In' position reduces scan to 90% of full size.

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Fig. 2-3. Right front-panel operational controls of 670A NTSC Picture Monitor. Other models are identical except for slight control changes and different model designations on the front panel.

Right Front-Panel Controls and Lights

POWER — Connects or interrupts ac line voltage to the transformer primary circuit.

DEGAUSS — Pushbutton operation for demagnetizing the metal parts of the picture tube.

INPUT — Pushbutton selects A or B encoded video input signals. The 'out' position selects channel A; the 'in' position selects channel B.

SYNC — Pushbutton for selecting INTernal or EXTernal synchronizing signal. The 'out' position selects INT; the 'in' position selects EXT. In EXT position, A and B external sync sources follow the INPUT switch positions.

MODE — Two pushbuttons for selecting the following three modes:

AUTO—AUTOmatic color mode; selected by leaving COLOR and B&W pushbuttons out. Presence of color burst enables the chroma channel. Absence of burst causes the chroma channel to be disabled.

COLOR—Selected by depressing the COLOR pushbutton only. Continuously activates the chroma channel whether burst is present or not.

B&W—Black & White mode; selected by pushing in the B&W pushbutton only. Deactivates the chroma channel so picture is displayed in monochrome.

SCAN — Three pushbuttons to select various scanning modes of operation.

Size—When pushed in, reduces picture to 90% of full size.

Horiz Delay—When pushed in, the picture is shifted horizontally to display horizontal sync, blanking, and burst. Brightness is automatically increased for ease in viewing.

Vert Delay—When pushed in, the picture is shifted vertically to display vertical sync and the vertical blanking interval. Brightness is automatically increased for ease in viewing. Picture is expanded 2.5X vertically if the Size pushbutton is set to normal (full).

Note

To obtain a pulse cross display, depress both the Vert Delay and Horiz Delay pushbuttons.

BRIGHTNESS — Controls picture brightness. The PRESET position is set by an internal adjustment.

CONTRAST — Controls picture contrast. The PRESET position is set by an internal adjustment.

APERTURE — Controls a variable amount of mid-frequency boost in the luminance channel to enhance picture sharpness. The PRESET position is fixed by an internal adjustment. If the user prefers more or less aperture correction, a qualified service technician can reset this adjustment to the desired setting.

CHROMA — Controls color saturation. A PRESET position is provided to obtain an internally-calibrated chroma setting.

HUE[1] — Controls hue or phase angle of the demodulated subcarrier. A PRESET position is provided to obtain an internally-calibrated hue setting. The HUE control is present on all models having an NTSC decoder.

NTSC TEST[2] — Pushbutton switch, when set to the 'out' position, modifies the matrix in the NTSC decoder to largely compensate for colorimetric errors. These errors are due to the differences between the taking (e.g., camera) and display primary colors.

When the pushbutton is depressed, the matrix returns to strict NTSC values to allow test and setup to be performed using a standard NTSC color bar signal.

DEMOD TEST (671A only)	Same function as NTSC TEST pushbutton, except that the DEMOD TEST pushbutton modifies the PAL decoder matrix circuit to compensate for colorimetric errors.
TEST Lamp[3]	Illuminates when the NTSC TEST (670A) or DEMOD TEST or SIMPLE-DELUXE (671A) pushbutton is pressed in.
OVERLOAD Lamp	Illuminates whenever the kinescope overdrive protection circuit is in operation; i.e., kinescope anode current is limited.
UNCAL Lamp	Illuminates brightly when the CONTRAST, HUE, or CHROMA controls are not in the PRESET position, and when the Horiz Delay or VERT Delay pushbuttons are pressed in. Illuminates dimly when the BRIGHTNESS control is not in the PRESET position.

[1]**Omitted on 671A Monitors.**

[2]**This is the PAL (SIMPLE-DELUXE) pushbutton on 671A Monitors.**

[3]**If desired, one end of R7605 on the right front-panel circuit board can be disconnected to prevent the TEST lamp from illuminating when the SIMPLE-DELUXE pushbutton is depressed on the 671A Monitor. A board illustration, provided on the back side of the LV Power Supply diagram, shows the location of R7605. Perform Steps 1 through 3 of the Right Front-Panel Board removal procedure in the Maintenance section to obtain access to the resistor.**

REAR-PANEL CONNECTORS

General Information

All signal connections to the picture monitor are made through bnc coaxial connectors located on the rear panel of the instrument (see Fig. 2-1). A pair of connectors for each input provides compensated loop-through connections so that the instrument can be connected into any part of a 75-ohm unbalanced coaxial cable video transmission system.

Using VIDEO INPUT A as an example, a loop-through connection is made as follows:

1. Connect incoming video to one of the VIDEO INPUT A connectors.

2. Connect the outgoing video cable to the other VIDEO INPUT A connector. The system component to be connected at the other end of this cable must have a 75-ohm input impedance.

If you are not using the loop-through method for signal connections, but would prefer to connect a television test signal generator or the end of a video transmission cable directly to the picture monitor, proceed as follows:

1. Connect the video signal to one of the VIDEO INPUT A connectors.

2. Connect a 75-ohm end-line termination to the other VIDEO INPUT A connector.

Loop-Through Connector Shield Connection

The instrument is shipped with the shield connection of the input loop-through connectors grounded to the chassis so that a useful picture is obtained when the monitor is operating in the presence of a strong rf field. These connectors can be ungrounded (floating); that is, the outer conductor or shield connection of the connectors can be isolated from the chassis.

Floating the connectors prevents ground currents (mains hum, for example) from interfering with the display. To unground the shield connection of a loop-through connector, remove the 4-40 X 0.312-inch PNH screw with lockwasher. This screw does not have an insulating washer and is located between the pair of connectors to be ungrounded.

VIDEO INPUT A and B Connectors

Two sync-negative (black negative) composite or non-composite video signals can be connected to the VIDEO INPUT A and B loop-through connectors. Use the right front-panel INPUT switch to select the desired input signal.

If non-composite video signals are applied to the VIDEO INPUT A and B connectors, apply an external synchronizing signal to the appropriate rear-panel EXTernal SYNC input connector and set the right front-panel SYNC switch to EXT.

EXTernal SYNC A and B Connectors

The EXTernal SYNC connectors accept external signals for synchronizing the color monitor. The signals follow the selection by the front-panel INPUT switch. To use a single sync source for both positions of the switch, loop the EXT SYNC A signal to the EXT SYNC B connector.

The external sync signal must be 0.5 V to 2 V peak-to-peak sync-negative composite video or 0.5 V to 8 V peak-to-peak negative composite sync.

Tally Light Power Input Connector

This connector provides remote operation of the front-panel incandescent tally light when an external 24 V ac or dc source is applied. A qualified service person can make the proper electrical connections to this connector.

Instructions for ordering a connector plug and wiring it are provided in Part II—Service & Installation portion of this manual.

R-Y (or V) and B-Y (or U) Demodulated CHROMA Output Connectors

These connectors provide high-impedance outputs from the R-Y (or V) and B-Y (or U) demodulated circuits for driving the TEKTRONIX 602 or 604, Option 5 Display Unit to produce vector displays. The 602 and 604 have an internal multistandard vector-display graticule so they can be driven by a multistandard color picture monitor.

The TEKTRONIX 602 or 604, Option 5 Display Unit is not only useful for monitoring color television signals being applied to the picture monitor. It is also useful for evaluating the effects of adjustments that are made when recalibrating the color monitor.

OPERATIONAL CHECK

The following procedure serves to assure the user that the monitor is functioning. The procedure also serves as first-time operating instructions to familiarize the user with front-panel controls. Specifications are not checked in this procedure.

Equipment Required

1. Source of one-volt peak-to-peak output signals into 75 ohms as follows: Standard encoded color bar test signals—100% saturated, 75% amplitude, 75% or 100% white reference. Setup level: 7.5% for NTSC models; 0% (blanking) for 50 Hz PAL models. Composite video or composite sync signal, 0.5 volt to 2 volts peak-to-peak into 75 ohms. (See Table 2-1 for recommended test signal generators.)

2. Coaxial cables (two required). Impedance, 75 ohms; length, 42 inches, bnc connectors. Tektronix Part No. 012-0074-00.

2. Terminations (two required). Impedance, 75 ohms; end-line type; bnc connectors. Tektronix Part No. 011-0102-00.

PROCEDURE

1. Connect the standard color bar test signal, via a 75 ohm coaxial cable, to one of the VIDEO INPUT A connectors on the rear panel of the monitor. Connect a 75 ohm termination to the other loop-through VIDEO INPUT A connector.

2. Connect the composite video or composite sync signal, via a 75 ohm coaxial cable, to one of the EXTernal SYNC A connectors on the rear panel of the monitor. Connect a 75 ohm termination to the other loop-through EXT SYNC A connector.

3. Connect the monitor to a suitable ac power source. Set the monitor POWER switch to ON, and check that the signal source is turned on. Allow approximately 20 minutes for warmup.

4. Set all monitor front-panel slide switches to the up position. Set the right front-panel variable controls to the PRESET position. Check that all pushbuttons are set to the out position.

5. Depress the DEGAUSS pushbutton for at least 10 seconds.

6. A stable color bar test signal should be displayed on the monitor screen.

Right Front-Panel Controls

Pushbuttons:

7. Press in the INPUT pushbutton. This selects VIDEO INPUT B as the displaying channel. Since no signal is connected to the rear-panel VIDEO INPUT B connectors, the screen should be blank. Return the INPUT pushbutton to the out position.

8. Press in the SYNC pushbutton. This selects EXTernal as the sync source. A composite video or sync signal is connected to the rear-panel EXT SYNC A connector, so the display should remain stable and locked in. Disconnect the coaxial cable connected to the EXT SYNC A connector. The display should lose sync. Reconnect the coaxial cable and return the front-panel SYNC pushbutton to the out position.

9. Turn off the burst components of the color bar test signal at the test signal source. The display should lose all chrominance information, leaving a monochrome (gray-shades) bar display.

Press in the COLOR pushbutton. The chroma channel is activated whether burst is present or not. The display should be monochrome bars, with horizontal red, blue, and green stripes rolling vertically through the display. Return the COLOR pushbutton to the out position. Turn on the burst components of the color bar test signal.

Press in the B & W (black and white) pushbutton. The display should be monochrome bars. Return the B & W pushbutton to the out position. The display should be a stable color bar test signal.

10. Press in the SCAN Size pushbutton (left SCAN button). The display should be reduced to approximately 90% of normal size. The position is useful in setting up picture position and convergence. Return the SCAN Size pushbutton to the out position.

11. Press in the SCAN Horiz Delay pushbutton (middle SCAN button). The picture is shifted horizontally to display sync, burst, and blanking. Brightness is automatically increased for easier viewing. The UNCAL lamp should light. Return the SCAN Horiz Delay pushbutton to the out position.

12. Press in the SCAN Vert Delay pushbutton (right SCAN button). The picture is shifted vertically to display vertical blanking details, with brightness automatically increased. The picture is expanded vertically for improved resolution (if the SCAN Size is left in the out position). No vertical expansion will occur if SCAN Size is pressed in. The UNCAL lamp should light. Return the SCAN Vert Delay to the out position.

13. Press in the SCAN Horiz Delay and Vert Delay pushbuttons simultaneously. This provides a Pulse Cross display, with the picture shifted both horizontally and vertically. The UNCAL lamp should light. Brightness is automatically increased, and the picture is expanded vertically. (Vertical expansion occurs only when the SCAN Size button is in the out position.) Return the SCAN Vert Delay and Horiz Delay to their out positions.

14. Press in the NTSC TEST pushbutton (for 670A Monitors) or the DEMOD TEST pushbutton (for 671A Monitors). A slight change in red color brilliance or saturation will be noticed, and the UNCAL lamp should be illuminated. See Right Front-Panel Controls and Lights in this section for further description. Return the NTSC TEST (or DEMOD TEST) pushbutton to the out position.

15. PAL SIMPLE-DELUXE pushbutton (671A Monitors only). This control is used in checking phase error. It should have no apparent effect on the display of a standard color bar signal. The UNCAL lamp should light when this pushbutton is pressed in.

Variable Controls:

16. Turn the BRIGHTNESS control out of the PRESET position, and rotate the control slowly in a clockwise direction. Note that the display brightness increases as the control is turned clockwise. Return the BRIGHTNESS control to PRESET.

17. Turn the CONTRAST control out of the PRESET position, and rotate the control slowly in a clockwise direction. Note that the display contrast increases as the control is turned clockwise. Return the CONTRAST control to PRESET.

18. Turn the CHROMA control out of the PRESET position, and rotate the control slowly in a clockwise direction. Note that the display chrominance (color saturation) increases as the control is turned clockwise. Return the CHROMA control to PRESET.

19. (670A only) Turn the HUE control out of the PRESET position, and rotate the control slowly in a clockwise direction. Note that the hue (tint) of the color bar segments changes as the control is rotated. Return the HUE control to PRESET.

NOTE

Observe that the UNCAL lamp illuminates when the BRIGHTNESS, CONTRAST, CHROMA, or HUE controls are turned out of the PRESET position.

Left Front-Panel Controls

Use of these controls is covered later in this section under Left Front-Panel Adjustment Procedure.

LEFT FRONT-PANEL ADJUSTMENT PROCEDURE

Use the following procedure to check and adjust your monitor for optimum performance. This procedure applies to all monitors described in this manual.

TEST EQUIPMENT

1. Television Test Signal Generator. One volt peak-to-peak output signals into 75 ohms as follows:

a. Encoded color bar signal. 100% saturated, 75% amplitude color bars, 75% or 100% white reference. Setup: 7.5% for NTSC models; 0% (blanking) for 50 Hz PAL models; 50 mV for 60 Hz PAL models.

b. Convergence crosshatch pattern. For NTSC and 60 Hz PAL monitors: 17 vertical lines; 14 horizontal lines. For 50 Hz PAL monitors: 20 vertical lines; 15 horizontal lines.

c. Full screen flat field signal.

For NTSC models: 10 IRE, 20 IRE, and 100 IRE (flat field signals)

For 50 Hz and 60 Hz PAL models: Blanking (0% peak white), 10%, and 100% flat field signals.

Use a generator that is properly encoded for driving the monitor. Signal generators that are available from Tektronix are listed in Table 2-1.

Table 2-1

TELEVISION TEST SIGNAL GENERATORS

Television Standard	Tektronix Test Signal Generator
NTSC	140, 144, 146, 149, 1470, or 1410/TSG1/TSG2/TSG3
50 Hz PAL	141A Option 1 or 145
60 Hz PAL	142 or 145-M

NOTE

The 1470 Generator does not produce 10 IRE and 20 IRE flat field signals. These signals are needed if you intend to match several monitors using the J16 Photometer.

2. Tektronix Linearity Graticule. Full screen film positive that can be positioned directly over the viewing screen (see Fig. 2-4). Tektronix Part No. 331-0305-01 for a graticule that is compatible with the NTSC and 60 Hz PAL Tektronix generators. Tektronix Part No. 331-0359-01 for a graticule that is compatible with the 50 Hz PAL Tektronix generators.

3. Light Source for Linearity Graticule. 150-watt incandescent light placed two feet in front of the monitor to project a shadow from the linearity graticule onto the screen phosphor.

4. Reference Light Source (Optical Comparator). For use as a "primary" standard to recalibrate the monitor high-light color temperature to 6500° K at 30 footlamberts. Also, the light source reference field must be adjustable to a very low light level for setting the low light color balance when a low-brightness flat field signal is displayed.

A Grafikon, or other similar device, such as a Hellige IRT or Macbeth can be used.

5. (Optional) Photometer or Luminance Meter. Useful for measuring luminance in footlamberts or candelas/m^2. A description of the TEKTRONIX J16 Digital Photometer follows:

For NTSC and 60 Hz PAL color monitors, use a TEKTRONIX J16 Digital Photometer with a J6503 Luminance Probe to measure footlamberts. For 50 Hz PAL color monitors, use the TEKTRONIX J16 Option 2 Photometer with a J6503 Option 2 Luminance Probe to measure in candelas/m^2 if metric units are preferred.

Another feature of the J16 Photometer is that it can be used with a J6502 Irradiance Probe to derive low and high light-output readings for the red, green, and blue screen displays. These readings can be recorded and used again when rechecking the color monitor. They can also be used to quickly readjust other Tektronix color monitors to match the one selected to be the "standard".

The J6502 Irradiance Probe measures irradiance in US units (microwatts/cm^2). To measure irradiance in metric units (milliwatts/m^2), use a J6502 Option 2 with a J16 Option 2 Photometer.

6. Coaxial Cable. Impedance, 75 ohms; length, 42 inches; equipped with bnc connectors. Tektronix Part No. 012-0074-00.

7. 75-Ohm Termination. Equipped with bnc connectors. Use an end-line termination (Tektronix Part No. 011-0102-00). A feed-through termination (Tektronix Part No. 011-0103-02) can be used as a substitute.

PRELIMINARY PROCEDURE

1. Apply a standard color bar signal from a television test signal generator through a 75 ohm coaxial cable to the monitor VIDEO INPUT A connector. Terminate the other VIDEO INPUT A loop-through connector into 75 ohms.

2. Set all the front-panel slide switches to the up position. Set the right front-panel variable controls to the PRESET position. Check that all pushbuttons are set to the out position except as follows: Push in the NTSC TEST pushbutton on the 670A Monitor; push in the DEMOD TEST pushbutton on the 671A and 672 Monitors.

3. Allow at least 30 minutes warmup at 25° C, ±5° C, before proceeding with the adjustments.

4. Depress the DEGAUSS pushbutton for at least 10 seconds.

5. Decrease the room lighting to semi-darkness.

PURITY
Equipment Needed: 1, 6, and 7

1. Check Purity

a. Display a 100 IRE or 100% flat field signal.

b. Set the monitor GREEN and BLUE SCREEN switches to OFF. Depress the DEGAUSS pushbutton for at least 5 seconds.

c. CHECK—that the display is uniformly red. If any impurity is observed, use a hand-held degaussing coil to demagnetize the surrounding metal parts. This is especially necessary if the monitor is installed in a cabinet rack.

If impurity is still present, check for excessive misconvergence. A quick check can be made by performing Steps 4 and 5 in this procedure before going to part d of this step.

NOTE

If impurity is present after degaussing the monitor and converging the beams, a qualified service technician must follow the service instructions for purity given in Part II—Service & Installation portion of this manual.

d. Set the RED SCREEN switch to OFF and the GREEN SCREEN switch to ON.

e. CHECK—for a uniformly green screen display.

f. Set the GREEN SCREEN switch to OFF and the BLUE SCREEN switch to ON.

g. CHECK—for a uniformly blue screen display.

NOTE

If impurity is present when performing parts e and g of this step, refer servicing to a qualified service technician.

h. Set the RED and GREEN SCREEN switches to ON.

PICTURE POSITION AND SIZE ADJUSTMENTS
Equipment Needed: Items 1, 2, 3, 6, and 7

2. VERTICAL and HORIZONTAL CENTERING

a. Display a convergence crosshatch pattern.

b. Set the RED and BLUE SCREEN switches to OFF so that a green screen crosshatch pattern is displayed.

c. Set the VERT SCAN switch to SETUP.

d. Set the test signal generator Convergence Vert and Horiz Position controls so that the crosshatch pattern is properly centered. That is, the vertical lines at the left and right sides of the display should be positioned equal distances from the edges of video blanking (not the bezel or screen edges); the horizontal lines at the top and bottom sides of the display should be positioned equal distances from the edges of video blanking.

e. Set the VERT SCAN switch to the NORMAL position.

f. Place the linearity graticule directly over the viewing screen of the monitor. After properly centering the graticule over the screen, tape the graticule in a few places to hold it in position.

g. Place an incandescent light source two feet away from the front of the monitor and aimed at the center of the screen.

h. ADJUST—the monitor VERT and HORIZ CENTERING adjustments to center the display at the center of the graticule area.

3. VERTICAL and HORIZONTAL SIZE

a. CHECK—after completing Step 2, that the crosshatch pattern intersections are located in the small circles projected on the screen. The tolerance is ±1% of picture height within the central area bounded by a circle whose diameter equals the picture height. This is the area within the large circle pointed out in Fig. 2-4. Outside of the central area, the tolerance is ±2% of picture height.

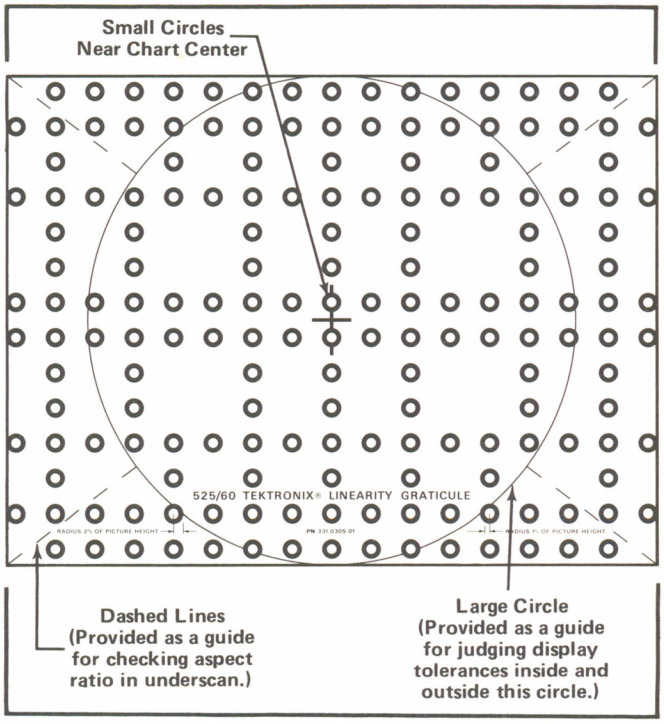


Fig. 2-4. 525/60 Tektronix Linearity Graticule.

b. ADJUST—the monitor VERTICAL and HORIZTONAL SIZE adjustments for the best size that places the intersections of the crosshatch pattern within the tolerances described in part a of this step.

NOTE

If the display is tilted, yoke adjustment must be made by a qualified service technician. Instructions are provided in Part II—Service & Installation portion of this manual.

c. Remove the linearity graticule and light source.

d. Set the RED and BLUE SCREEN switches to ON.

CONVERGENCE ADJUSTMENTS
Equipment Needed: Items 1, 6, and 7

4. VERTICAL and HORIZONTAL STATIC

a. Using the same test setup as described in Step 2 part a, check that a convergence crosshatch pattern is displayed.

b. ADJUST—the monitor VERTICAL and HORIZONTAL STATIC controls to converge the center area of the display.

5. VERTICAL and HORIZONTAL TILT

a. ADJUST—the monitor VERTICAL and HORIZONTAL TILT adjustments for best convergence near the edges of the display.

b. INTERACTION—Slight readjustment of the STATIC adjustments may be necessary. Optimize the adjustments for best convergence in full size scan.

SCREEN ADJUSTMENTS
Equipment Needed: Items 1, 4, 6, and 7

6. Check SCREEN BIAS Adjustments

a. Apply a 75% amplitude standard color bar signal from the television test signal generator through a 75 ohm coaxial cable to the monitor VIDEO INPUT A connector. Terminate the other VIDEO INPUT A connector into 75 ohms. Set the color bar test signal setup level to 7.5% for NTSC, 0% setup for European PAL, and 50 mV for PAL-M.

b. Check that the room lighting is at a similar level to that where the monitor will be used. Also, check that the front-panel controls are set as described in Step 2 of the Preliminary Procedure.

c. Set the monitor VERT SCAN switch to SETUP and the MODE pushbuttons to B&W.

d. CHECK—the black bar at the right side of the display. This black bar should appear dark gray due to the increased display brightness in this mode of operation. If the bar is dark gray, go to part e of this step.

If the black bar is not dark gray (black, light gray, or a color shade), go to Step 7.

e. Set the VERT SCAN switch to NORMAL.

f. CHECK—that a proper gray scale display is obtained. If the display shows the proper shades of gray, go to Step 11; if not, go to Step 10.

7. Adjust RED SCREEN BIAS

a. Set the GREEN and BLUE SCREEN switches to OFF. Set the MODE pushbuttons to AUTO and check that the VERT SCAN switch is set to SETUP.

b. ADJUST—the RED SCREEN BIAS adjustment so that the black bar areas just become black. This is accomplished by turning the adjustment clockwise until the black areas become dimly red. Then, turn the adjustment slowly counterclockwise until the dimly red areas just become extinguished.

NOTE

If one or more of the front-panel SCREEN BIAS adjustments are presently at the extreme end of their adjustment range, a qualified service technician must follow the Screen Volts (R6785) adjustment procedure given in Adjustment Procedures Part II—Service & Installation portion of this manual before going to Step 8.

8. Adjust GREEN SCREEN BIAS

a. Set the monitor RED SCREEN switch to OFF and the GREEN SCREEN switch to ON.

b. ADJUST—the GREEN SCREEN BIAS adjustment so that the black bar areas just become black. Use a procedure similar to the one described in Step 7 part b.

9. Adjust BLUE SCREEN BIAS

a. Set the monitor GREEN SCREEN switch to OFF and the BLUE SCREEN switch to ON.

b. ADJUST—the BLUE SCREEN BIAS adjustment so that the black bar areas just become black. Use a procedure similar to the one described in Step 7 part b.

10. Final Settings for SCREEN BIAS Adjustments

a. Set the monitor VERT SCAN switch to NORMAL. Set the RED and GREEN SCREEN switches to ON and check that the BLUE SCREEN switch is set to ON.

b. Set the test signal generator for a white flat field output signal as follows: 20 IRE (NTSC or PAL-M); 10% (European PAL).

c. Hold the reference light-source so that the light pipe is placed against the monitor faceplate at the center of the screen. Adjust the brightness of the light-source reference field to match the brightness of the test spot.

NOTE

Be sure that the ambient lighting in the room is sufficiently low and the proper color, so that the light-source reference field is not affected. This check can be made by turning off the room lights or using a black cloth as a cover to block out extraneous room lighting.

d. CHECK—low-light color balance. The color of the test spot (all beams on) should match the color of the light-source reference field.

e. ADJUST—the appropriate SCREEN BIAS controls to make the color of the test spot match the light-source reference field. Slight readjustment of the reference field brightness may be necessary to match the brightness of the test spot.

11. Adjust RED and BLUE SCREEN GAIN

a. Set the test signal generator controls for a 100 IRE (NTSC or PAL-M) flat field or white window signal if the reference light-source has a 30 footlamberts setting. For European PAL, set the generator for a 100% peak white output signal. If the reference light-source output is less than 30 footlamberts, set the generator output to be within the range of the reference light-source.

b. CHECK—high-light color balance. The color of the test spot should match the color of the light-source reference field.

c. ADJUST—the front-panel RED and BLUE SCREEN GAIN adjustments so that the color and brightness of the test spot matches the light-source reference field.

NOTE

If the RED and BLUE SCREEN GAIN adjustments will not adjust for a match of the test spot to the light-source reference field (due to an excess or shortage of green content), a qualified service technician must follow the Contrast Preset (R7707) adjustment procedure given in Part II—Service & Installation portion of this manual before going to Step 12.

d. INTERACTION—Repeat Steps 10 part b through Step 11 part c until proper matching of test spot and light-source reference field is obtained at both light levels.

e. (OPTIONAL) CHECK & ADJUST—With the generator set for full (100 IRE or 100%) flat field or white window output, measure the monitor's screen brightness (all beams on), using a photometer or luminance meter. The brightness of the display should be 30 footlamberts within the tolerance of the measuring device. If necessary, repeat part c of this step, using a reference field brightness that will enable you to obtain the desired color monitor brightness and high-light color balance. Then, recheck low-light color balance by repeating Step 10 parts b through e.

12. (OPTIONAL) Color Balance Matching Procedure

The following procedure describes how to derive low- and high-light color balance readings for the red, blue, and green screens. Once these readings are derived, they can be recorded for use when rechecking the calibration of the color monitor anytime, and to readjust other TEKTRONIX 670A-Series Monitors to match the one chosen to be the "standard".

After first recalibrating the picture monitor low- and high-light color balance using a reference light-source (optical comparator), proceed as follows:

a. Connect a J6502 Irradiance Probe to the J16 Digital Photometer. Depress the J16 Power and X0.1 pushbuttons.

NOTE

The J16 Photometer X0.1 and X10 pushbuttons are used in this procedure when measuring irradiance in microwatts/cm^2. If you are using a J16 Option 2 Photometer with a J6502 Option 2 Probe to measure irradiance in milliwatts/m^2, use the X1 and X100 pushbuttons to obtain the proper readout ranges.

b. With no light entering the J6502 Probe, carefully zero the J16 Photometer.

c. Set the test signal generator for 10 IRE (NTSC or PAL-M) or 0% (European PAL) white flat field output.

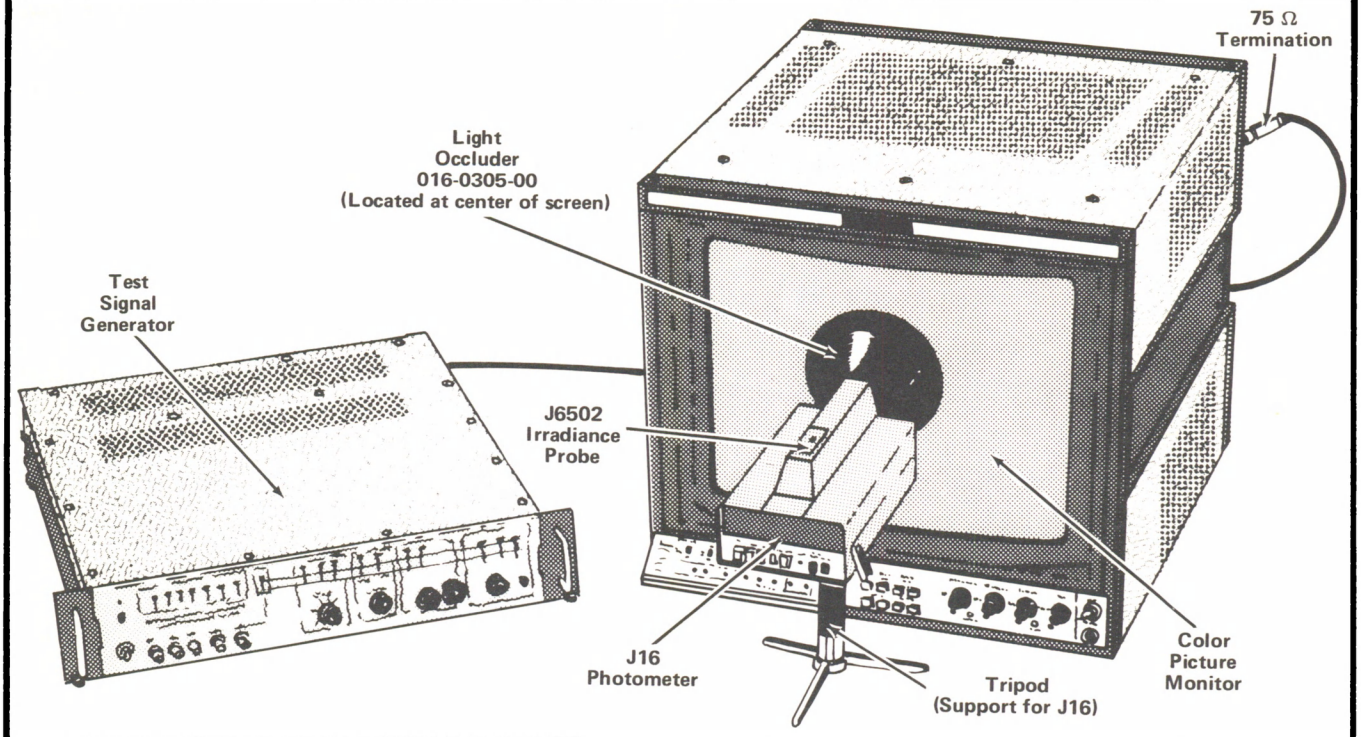
d. Press the DEGAUSS pushbutton for at least 5 seconds.

e. Using the setup shown in Fig. 2-5, take individual low-light output readings for the red, green, and blue screens. Record these readings in Table 2-2 and in the spaces provided on the 670A left front panel.

Table 2-2

PHOTOMETER READINGS

Test Signal Generator Output		J16 Photometer Readout		
NTSC & PAL-M	**PAL (Europe)**	**RED**	**GREEN**	**BLUE**
10 IRE	BLANKING			
100 IRE (30 FL)	100% peak White (103 candelas/m^2)			



COLOR TEMPERATURE MATCHING PROCEDURE

After first recalibrating the monitor low and high light color temperature using an optical comparator, proceed as follows using a J16 Photometer*:

1. Connect a J6502 Irradiance Probe to the J16, turn on POWER, and depress the X0.1 pushbutton.

2. With no light entering the J6502 Probe, zero the J16.

3. Set generator for 10 IRE (NTSC or PAL M) or blanking (PAL) flat field output. Using the setup shown in this illustration, take individual low light output readings for the red, green, and blue screens. Record these readings in Table 2-1 and on the monitor left front panel.

4. Connect a J6503 Probe to the J16 and depress the X1 pushbutton. Set generator for full (100 IRE or 100%) flat field output. Set the monitor CONTRAST control to obtain a reading of 30 footlamberts (103 candelas/m^2 when checking a 671 Monitor) on the J16.

5. Reconnect the J6502 Probe to the J16. Depress the X10 pushbutton. Take individual screen high light output readings and record them as described in step 3.

6. Return the CONTRAST control to PRESET. Adjust the monitor Contrast Preset (Green Gain), RED SCREEN GAIN, and BLUE SCREEN GAIN adjustments to obtain the same high light output readings as obtained in step 5.

7. Repeat steps 3 and 6 until the low and high light output levels agree with the recorded readings. The low light output adjustments for obtaining step 3 readings are RED, GREEN, and BLUE BIAS. This completes the procedure to calibrate a Tektronix Color Monitor for use as a "standard".

8. Table 2-1 recorded readings can be used to "standardize" other Tektronix Color Monitors operating under the same ambient light conditions.

*For a J16 Photometer with a J6502 Irradiance Probe that reads out in U.S. units $\mu W/cm^2$, use the X0.1 and X10 pushbuttons as given in the procedure. For a J6502 Probe that reads out in metric (SI) units mW/m^2, use the X1 and X100 pushbuttons.

TABLE 2-1

Generator Output		J16 Photometer Readout		
NTSC & PAL M	PAL (Europe)	RED	GREEN	BLUE
10 IRE	Blanking			
100 IRE (30 FL)	100% Peak White (103 candelas/m^2)			

NOTE: An interconnecting cable (Tektronix Part No. 012-0414-00) can be used to position the probe independently of the J16 Photometer.

Fig. 2-5. Equipment setup when using the TEKTRONIX J16 Digital Photometer to derive light-output readings for matching monitors.

f. Connect a J6503 Luminance Probe in place of the J6502 Probe to the J16 Photometer. Depress the J16 Photometer X1 pushbutton. Set the test signal generator for full (100 IRE or 100%) white flat field output. Set the monitor CONTRAST control to obtain a reading of 30 footlamberts (or 103 candelas/m^2 when checking a 671A Monitor) on the J16.

g. Remove the J6503 Probe and reconnect the J6502 Irradiance Probe to the J16 Photometer. Depress the X10 pushbutton. Take individual screen high-light output readings and record them as described in part e.

h. Return the CONTRAST control to PRESET. Adjust the monitor front-panel RED SCREEN GAIN and BLUE SCREEN GAIN adjustments to obtain the same light-output readings as those obtained in part g of this procedure.

NOTE

If the RED and BLUE SCREEN GAIN adjustments will not adjust for the same light-output readings as those obtained in part g of this procedure, a qualified service technician must follow the Contrast Preset (R7707) adjustment procedure given in Part II—Service & Installation portion of this manual before going to part i of this step.

i. Repeat part c. Adjust the monitor RED, GREEN, and BLUE SCREEN BIAS adjustments to obtain the same low-light output readings as those previously recorded in part e of this step. Set the generator for full (100 IRE or 100%) white flat field output and repeat part h. Do this as often as necessary to obtain the same low- and high-light output readings as those recorded in Table 2-2. This completes the procedure for calibrating a 670A-Series Monitor that will be used as a "standard".

j. Use the recorded light output readings in Table 2-2 to "standardize" other Tektronix Color Monitors that are operating under the same ambient light conditions.

TALLY SYMBOL INSTALLATION

There are two spring-loaded panels on the front of the instrument. These are located to the left and right sides of the tally light (see Fig. 2-6). To install a tally identification symbol that will be illuminated by the tally light, slide one of the spring-loaded panels inward slightly. Lift the panel sufficiently to clear the frame and then slide the panel outward over the frame.

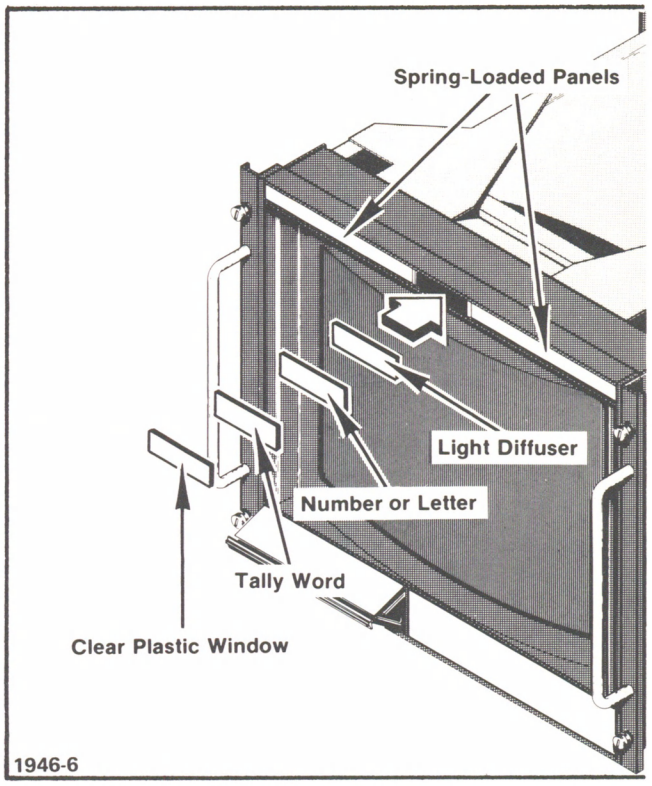


Fig. 2-6. Tally symbol installation.

NOTE

The tally identification set is shipped in the same carton as the instrument. Cut out the symbols to be installed.

The sequence for mounting the parts in the tally window is as follows (see Fig. 2-6).

1. Install the light diffuser in front of the lamp.

2. Place the tally number or letter in front of the light diffuser.

3. Install the tally word.

4. Install the clear plastic window.

5. Slide the spring-loaded panel to its original position.

SPECIFICATION

The following electrical characteristics are valid only if the instrument has been calibrated at an ambient temperature between +20° C and +30° C, and the instrument is operating at an ambient temperature between 0° C and +50° C. The instrument must have a warmup period of at least 30 minutes before checking specification.

Items listed in the Performance Requirements column of the Electrical Characteristics are verified by completing the Performance Check in Section 6 of this manual. Items listed in the Supplemental Information column are not verified in this manual; they are either explanatory notes or performance characteristics for which no limits are specified.

ELECTRICAL CHARACTERISTICS

Table 3-1

NTSC PERFORMANCE

Characteristics	Performance Requirement	Supplemental Information	Performance Check Step #
Connectors		Bnc	
Input Signal Level	0.5 V p-p minimum composite video; 2 V p-p maximum.		32
Input Impedance Unterminated		High Z bridging inputs loop-through compensated for 75 ohms (not internally terminated).	
Return Loss	At least 46 dB to 5 MHz, power on or off, input in use or not.		34
Maximum Safe Input		Exceeds CCIR Recommendation 451-2 (±5 V peak).	
Hum Rejection		Hum is at least 50 dB down when 4 V maximum rms mains hum signal is applied to the monitor in floating ground mode.	
Luminance Channel Dc Restoration		Back porch type; not affected by burst. Mains hum reduction due to dc restorer is less than 6 dB.	
Amplitude Linearity	Within 2%.		28
Bandpass		Approximately 3 MHz with variable APERTURE control set fully counterclockwise, but not in the detent position.	

Table 3-1 (cont)

NTSC PERFORMANCE (cont)

Characteristics	Performance Requirement	Supplemental Information	Performance Check Step #
APERTURE Corrector Range	0 dB to approximately 10 dB boost at 2.5 MHz. Preset aperture correction may be adjusted within this range according to user preference or application.		3
Chrominance Channel Demodulation Axis	R-Y, B-Y.		11, 12, 13
Bandpass		0.6 MHz equiband.	
Gain Range	Preset at 0 dB; adjustable from −6 dB to +10 dB.		9, 11
Residual Subcarrier Detection (on applied signal)	Color of displayed picture will shift due to any residual subcarrier. This feature can be inhibited by a jumper on the Decoder board.		31
Chrominance/Luminance Time Error	Less than 30 ns.		27
Gain Error	Less than 3%.		4, 9, 10, 11
Delay	Red to green to blue is less than 30 ns.		27
Subcarrier Regeneration Phase Error		Within 1° with input burst variation of ±10 Hz from 3.579545 MHz nominal burst level.	
With Temperature Variation		Within 5° with ambient temperature variations from 0°C to 50°C; within 1° for any 10°C increment within the range of 0°C to 50°C.	
With Input Signal Variation		Within 1° with input signal variation of ±3 dB from 1.0 V. Within 3° with variation of burst/sync ratio of −6 dB to +10 dB.	
Breezeway Stability		0.2° or less for burst timing errors including burst width variance (8-11 cycles), and breezeway variance of ±0.28 μs.	
Phase Error Due To Noise		Within 1° with rms white noise at −24 dB (0 dB = 700 mV rms).	

Table 3-2

PAL PERFORMANCE

Characteristics	Performance Requirement	Supplemental Information	Performance Check Step #
Connectors		Bnc	
Input Signal Level	0.5 V p-p minimum composite video; 2 V p-p maximum.		32
Input Impedance Unterminated		High Z bridging inputs loop-through compensated for 75 ohms (not internally terminated).	
Return Loss	At least 46 dB to 5 MHz, power on or off, input in use or not.		34
Maximum Safe Input		Exceeds CCIR Recommendation 451-2 (±5 V peak).	
Hum Rejection		Hum is at least 50 dB down when 4 V maximum rms mains hum signal is applied to the monitor in floating ground mode.	
Luminance Channel Dc Restoration		Back porch type; not affected by burst. Mains hum reduction due to dc restorer is less than 6 dB.	
Amplitude Linearity	Within 2%.		28
Bandpass		Approximately 3 MHz with variable APERTURE control set fully counterclockwise, but not in the detent position.	
APERTURE Corrector Range	0 dB to approximately 10 dB boost at 2.5 MHz. Preset aperture correction may be adjusted within this range according to user preference or application.		3
Chrominance Channel Demodulation Axis	U, V.		11, 12, 13, 14, 15
Bandpass		Approximately 1.2 MHz.	
Gain Range	Preset at 0 dB; adjustable from −6 dB to +10 dB.		9,13

Table 3-2 (cont)

PAL PERFORMANCE (cont)

Characteristics	Performance Requirement	Supplemental Information	Performance Check Step #
Residual Subcarrier Detection (on applied signal)	Color of displayed picture will shift due to any residual subcarrier. This feature can be inhibited by a jumper on the Decoder board.		31
Chrominance/Luminance			
Time Error	Less than 30 ns.		27
Gain Error	Less than 3%.		4, 9, 10, 13
Delay	Red to green to blue is less than 30 ns.		27
Subcarrier Regeneration Phase Error		Within 1° with input burst variation of ±10 Hz from 4.433619 MHz nominal burst level.	
With Temperature Variation		Within 5° with ambient temperature variation from 0°C to 50°C; within 1° for any 10°C increment within the range of 0°C to 50°C.	
With Input Signal Variation		Within 1° with input signal variation of ±3 dB from 1.0 V. Within 3° with variation of burst/sync ratio of −6 dB to +10 dB.	
Breezeway Stability		0.2° or less for burst timing errors including burst width variance (8-11 cycles), and breezeway variance of ±0.28 μs.	
Phase Error Due To Noise		Within 1° with rms white noise at −24 dB (0 dB = 700 mV rms).	

Table 3-3

PICTURE

Characteristics	Performance Requirement	Supplemental Information	Performance Check Step #
Height		10.1 inches (or 256 mm).	
Width		13.5 inches (or 342 mm).	
Underscan		Approximately 10% reduction in both height and width.	
Aspect Ratio		3:4.	
Deflection Linearity (Vertical and Horizontal)	±1% within a central area bounded by a circle whose diameter equals picture height; ±2% outside of the central area.		16, 17 (NTSC Procedure)
Convergence Error	Less than 1 mm within the central area. Outside of the central area, color separation (misconvergence) is less than 2 mm. Measurement is made from the center of one color line to the center of the other color line.		21, 24
Unblanking		All active picture elements are displayed. (Horizontal retrace is accomplished within 10 μs.)	
Color Temperature	6500° K.	Adjustable to other standards. Also, see Operating Instructions section.	26
Calibrated Contrast	30 footlamberts at peak white of standard 1 V signal.		26
Calibrated Brightness	Displayed black may be adjusted to black level of input signal.		10
EHT (Extremely High Tension)	24 kV nominal, regulated. Load variations cause less than 1% picture height variation.	Monitor complies with DHEW standards under Radiation Control for Health and Safety Act of 1968, applicable at date instrument was manufactured.	33
Kinescope Protection		Failure of horizontal or vertical scanning shuts off the EHT. Failure of H.V. Regulator circuit does not cause EHT to soar excessively. EHT supply is current limited.	
Kinescope Heater Voltage		Regulated dc.	

Table 3-4

SYNC & TIMING

Characteristics	Performance Requirement	Supplemental Information	Performance Check Step #
Connectors		Bnc.	
Input Signal Range	Composite sync 0.5 V p-p to 8 V p-p or composite video 0.5 V p-p to 2 V p-p.		32
Input Impedance Unterminated		High Z bridging inputs loop-through compensated for 75 ohms (not internally terminated).	
Terminated		75 ohms.	
Return Loss	At least 46 dB to 5 MHz with respect to 75 ohms.		34
Hum Rejection		Hum is at least 50 dB down when 4 V maximum rms mains hum signal is applied to the monitor in floating ground mode.	
Synchronization		Stable subcarrier regeneration, limited by line sync performance. Line sync white noise immunity is 20 dB. Field sync white noise immunity is 20 dB. Field sync will remain stable with tilt equal to 100% of sync amplitude in vertical blanking or with 20 IRE mains hum.	
AFC		Two-loop AFC type.	
Phase Corrector		Corrects for phase errors due to side pin cushion correction and other effects within the monitor.	
Slow AFC		Displays timing errors of incoming sync; particularly, 60 Hz or 240 Hz timing errors. Bandwidth is approximately 25 Hz.	
Fast AFC		Largely corrects for incoming sync errors; approximately 2 kHz bandwidth.	
Scan Delay Horizontal Delay		Approximately 1/4 line; displays burst.	

Table 3-4 (cont)

SYNC & TIMING (cont)

Characteristics	Performance Requirement	Supplemental Information	Performance Check Step #
Vertical Delay		Approximately 1/2 field; vertical scan is expanded unless underscan is activated.	
Pulse Cross (Horiz Delay and Vert Delay both activated)		Displays horizontal and vertical blanking intervals; vertical blanking is expanded unless underscan is activated. All equalizing pulses are displayed.	

Table 3-5

POWER SUPPLY

Characteristics	Performance Requirement	Supplemental Information	Performance Check Step #
Line Voltage Range 115 Vac	Within 10% (104 Vac to 126 Vac).		1 (NTSC)
230 Vac	Within 10% (207 Vac to 253 Vac).		1 (PAL)
Crest Factor		At least 1.3.	
Line Current 115 Vac (60 Hz)		2.5 A rms maximum. Current is substantially higher during degaussing.	
230 Vac (50 Hz)		1 A rms maximum. Current is substantially higher during degaussing.	
Degaussing Surge Current		5 A rms.	
Power Consumption		230 watts maximum, 185 watts typical.	
Line Frequency		48 Hz to 66 Hz.	

PHYSICAL CHARACTERISTICS

Table 3-6

FINISH: Vinyl paint on frame and cabinet covers. Anodized aluminum front panels.

DIMENSIONS (Overall)	Cabinet Version	Rackmount Version
Height	16 inches (40.600 cm)	15.72 inches (39.90 cm)
Width	17.45 inches (44.32 cm)	19.0 inches (48.26 cm)
Length	20.75 inches (52.70 cm)	21.725 inches (55.18 cm)
WEIGHTS		
Net Weight	79 lbs (35.8 kg)	89 lbs (40.4 kg)
Domestic Shipping Weight	97 lbs (44.0 kg)	107 lbs (48.5 kg)
Export-Packed Weight	122 lbs (55.3 kg)	132 lbs (59.9 kg)

ENVIRONMENTAL CHARACTERISTICS

The following environmental test limits apply when tested in accordance with the recommended test procedure. This instrument will meet the electrical performance requirements given in this section following an environmental test.

TEMPERATURE

NON-OPERATING: −40° C to +65° C.
OPERATING RANGE: 0° C to +50° C.

ALTITUDE

NON-OPERATING: To 50,000 feet.
OPERATING RANGE: To 15,000 feet.

VIBRATION: To 0.015 inch p-p displacement at 50 Hz.

SHOCK: To 30 g's, 1/2 sine, 11 ms duration.

ACCESSORIES

A listing of standard accessories supplied with this instrument can be found on the last page of the Replaceable Mechanical Parts list illustrations. For additional accessories, see the current Tektronix, Inc. Television Products catalog.

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

PART II
SERVICE & SETUP INFORMATION

WARNING

SERVICE INSTRUCTIONS ARE INTENDED FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK DO NOT ATTEMPT ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATOR'S INFORMATION PORTION UNLESS YOU ARE QUALIFIED TO DO SO.

INTRODUCTION

This part of the manual is to be used by qualified personnel only. In addition to the Safety Information that follows, please read the Safety Summary located at the start of "Part I—Operator's Information."

INSTALLATION

Safety Information

The following are general safety precautions that must be observed during all phases of operation and maintenance.

WARNING

Do not service or make internal adjustments to this instrument unless another person, capable of giving first aid and resuscitation, is present.

Avoid live circuits. Electrical shock hazards are present in the instrument. To avoid electrical shock, disconnect the instrument from the power source before touching components or soldering.

Avoid coming in contact with components that are operating at a high temperature, such as the high wattage resistors spaced above the board, power transistors, and some of the metal case transistors.

Handle silicone grease with care. Avoid getting silicone grease in the eyes. Wash hands thoroughly after use.

Power Transformer and Fuse

The instrument is delivered wired for either 115 Vac or 230 Vac operation, with a proper fuse installed. The mains voltage for which the instrument is wired is indicated by a metal tag on the rear panel adjacent to the power receptacle.

If the operating voltage of the instrument needs to be changed, use the following procedure:

WARNING

Disconnect the power cord before proceeding.

1. Remove the bottom dust cover from the instrument.

2. Slide the clear plastic split tubing off the transformer terminals.

3. Change the transformer primary connections.

a. For 115-volt operation the jumper wires are connected between terminals 1 and 2, and terminals 3 and 4, as shown in Fig. 4-1A.

b. For 230-volt operation only one jumper wire is used. This jumper connects between terminals 2 and 3 as shown in Fig. 4-1B.

4. Re-install the plastic tubing and dust cover.

5. Remove the metal tag that indicates the mains voltage, turn it over, and pencil in the new mains voltage information.

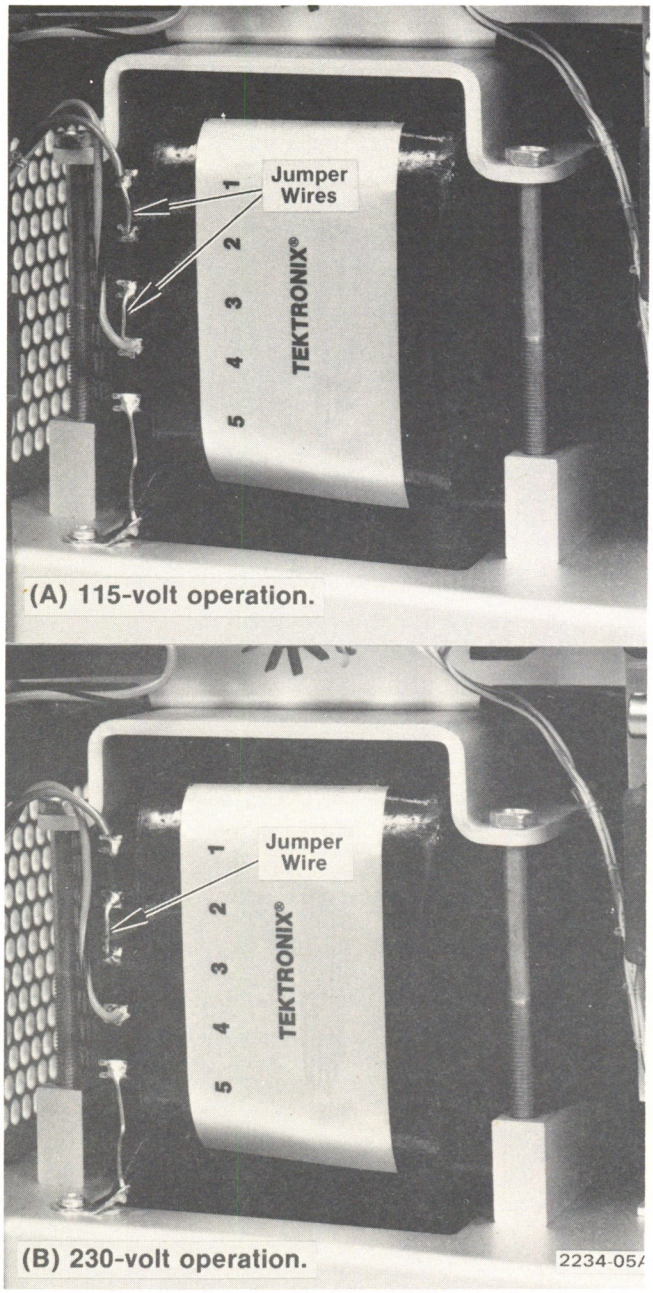


Fig. 4-1. Left side rear portion of the instrument showing the LV power transformer primary connections.

6. Change the fuse. The fuse holder and data is located near the power receptacle.

Tally Light Power Input 24 V Connector

This connector provides remote operation of the front-panel tally light when an external 24-V ac or dc source is applied to two pins of the 3-pin connector. The tally light circuit is not grounded, and consists of two 14 V incandescent lamps connected in series.

Refer to Fig. 4-2 and the L.V. Power Supply diagram when wiring the plug (not supplied) that mates with the TALLY LIGHT POWER INPUT 24 VOLTS connector.

If you need to order a plug, the description is as follows: Connector, female, with cable clamp; Cinch-Jones S-303-CCT; Tektronix Part No. 131-1328-00.

OPERATING CHANGES

Introduction

Some circuit boards in the 670A-Series instruments have jumper connectors that can be moved to change the operation of the monitor. This portion of the manual describes these changes and shows the location of the jumpers.

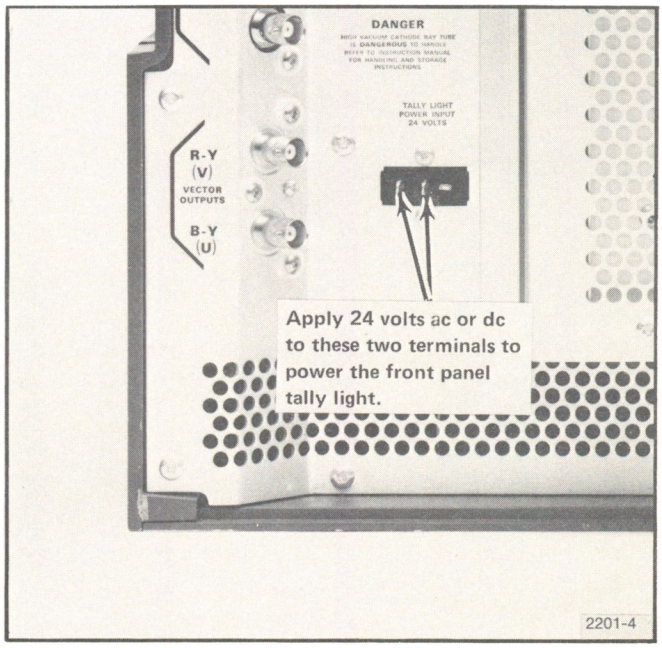

DANGER
TALLY LIGHT POWER INPUT 24 VOLTS
R-Y (V)
VECTOR OUTPUTS
B-Y (U)
Apply 24 volts ac or dc to these two terminals to power the front panel tally light.
2201-4

Fig. 4-2. Tally light external power connections.

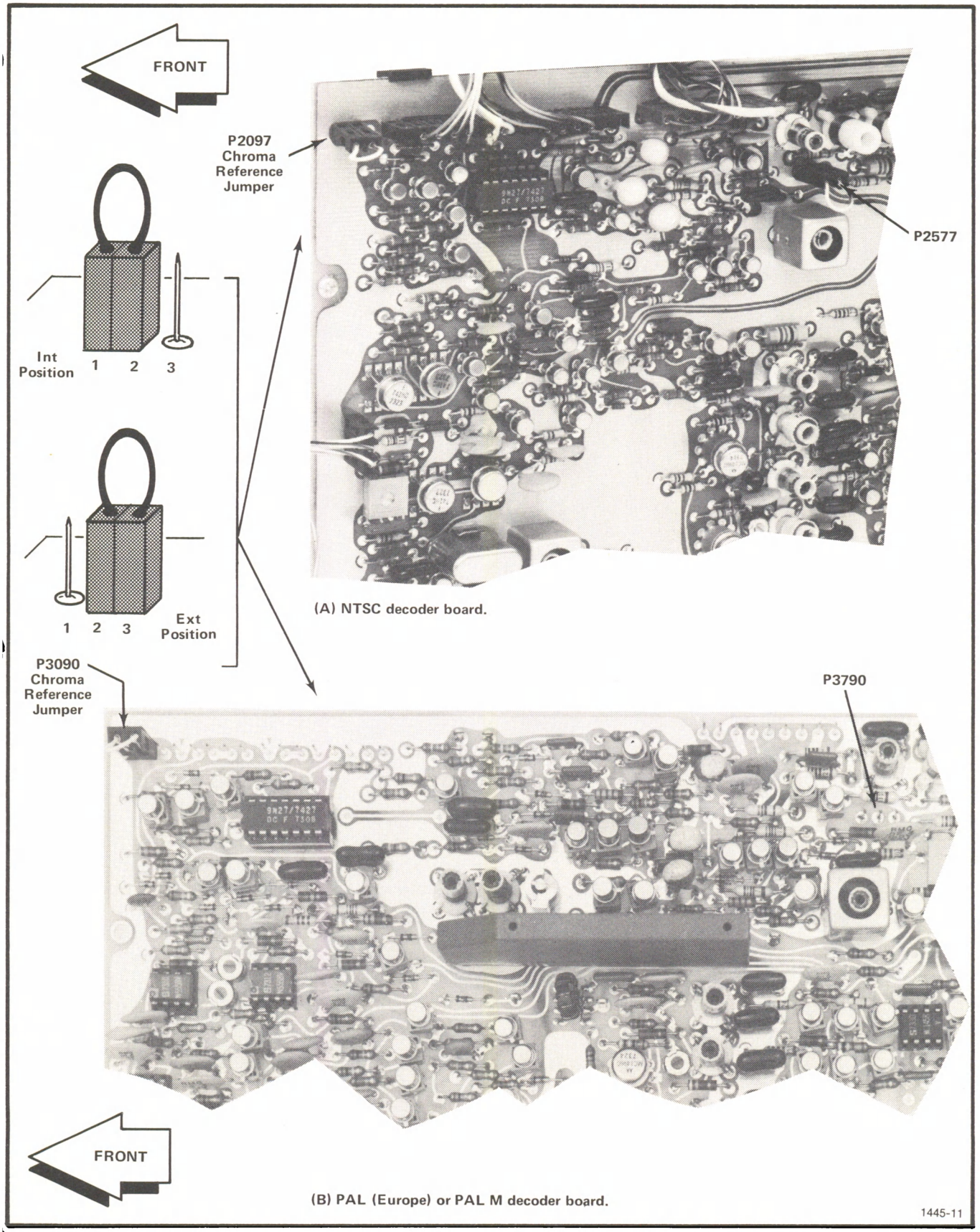


Fig. 4-3. Right side view, showing locations of the Decoder circuit board jumpers. Right frame section was removed to provide a clear view.

Residual Subcarrier

The following information applies to monitors with either an NTSC or PAL decoder board installed in the instrument.

A Chroma Zero Reference (Residual Subcarrier) jumper is provided on the Decoder board. For monitors with the NTSC decoder, this jumper is P2097 (see Fig. 4-3A); for monitors with 50 Hz PAL or 60 Hz PAL decoders, this jumper is P3090 (see Fig. 4-3B).

As connected at the factory, the jumper is set to the INT position; that is pins 1 and 2 are jumpered. This position enables the monitor to display the effects of residual subcarrier that may be present in the composite video color signal applied to the monitor. Residual subcarrier, if present, causes the displayed colors to shift.

If you prefer to remove the effects of residual subcarrier from the displayed picture, move the jumper connector to the EXT position so that pins 2 and 3 are jumpered.

The EXT position of the Residual Subcarrier jumper is also useful for displaying velocity error, if present, when operating a VTR (video tape recorder). Velocity error consists of two major chroma distortions:

1. Chroma amplitude or saturation errors due to minute head-to-head differences, compensation for incorrect guide height settings, and non-uniform coating of the magnetic recording tape.

2. Chroma phase caused by incorrect guide height or head-to-head scanning differences between record and playback.

AFC Jumper

An AFC (Automatic Frequency Control) jumper (P1699) is provided on the Sync and Timing board to permit selection of the mode of AFC operation, either Slow or Fast. In the Slow mode, incoming sync errors are displayed; particularly, those at 60 Hz and 240 Hz. In the Fast mode, these errors are not displayed.

For Slow AFC operation, jumper P1699 is stored on one pin as shown in Fig. 4-4. For Fast AFC operation, the jumper is connected to both pins.

Bandpass Jumpers

As shown in Fig. 4-3A, the Bandpass jumper for monitors with an NTSC decoder is P2577; for monitors with a 50 Hz PAL or 60 Hz PAL decoder, the jumper is P3790 as shown in Fig. 4-3B. Check that this jumper is set to the Narrow position; that is, pins 1 and 2 are jumpered as shown in the illustration. This is the factory-set normal operating position.

The Bandpass jumper controls the bandwidth and delay time of the luminance signal in the Luminance Processing circuit on the Decoder board. In the Narrow position, the luminance signal is delayed to compensate for circuit delays in chrominance processing. Also, a chroma trap removes unwanted chrominance information from the luminance channel.

In the Wide position of the jumper, pins 2 and 3 are jumpered to allow the delay line and chroma trap to be bypassed, so that full bandwidth signals are applied to the luminance processing circuits. This position is useful only when troubleshooting to check circuit operation.

RACKMOUNTING

Instrument Dimensional Drawings

Refer to Figures 4-5 and 4-8.

Description of Slide-Out Track Assemblies

The slide-out tracks consist of two assemblies, one for the left side of the monitor and one for the right side. Each assembly consists of three sections as illustrated in Fig. 4-6. The stationary section with its intermediate section attaches to the front and rear rails of the rack with inside dimensions as indicated in Fig. 4-7. The chassis sections attach to the left and right sides of the instrument.

The stationary and intermediate sections are shipped as a matched set as shown in Fig. 4-6, and should not be separated. Extra hardware is provided with the slide-out track assemblies. This hardware enables the slide-out tracks to be mounted in a variety of racks. Since not all of the hardware will be used for rackmounting the instrument, some parts will be left over.

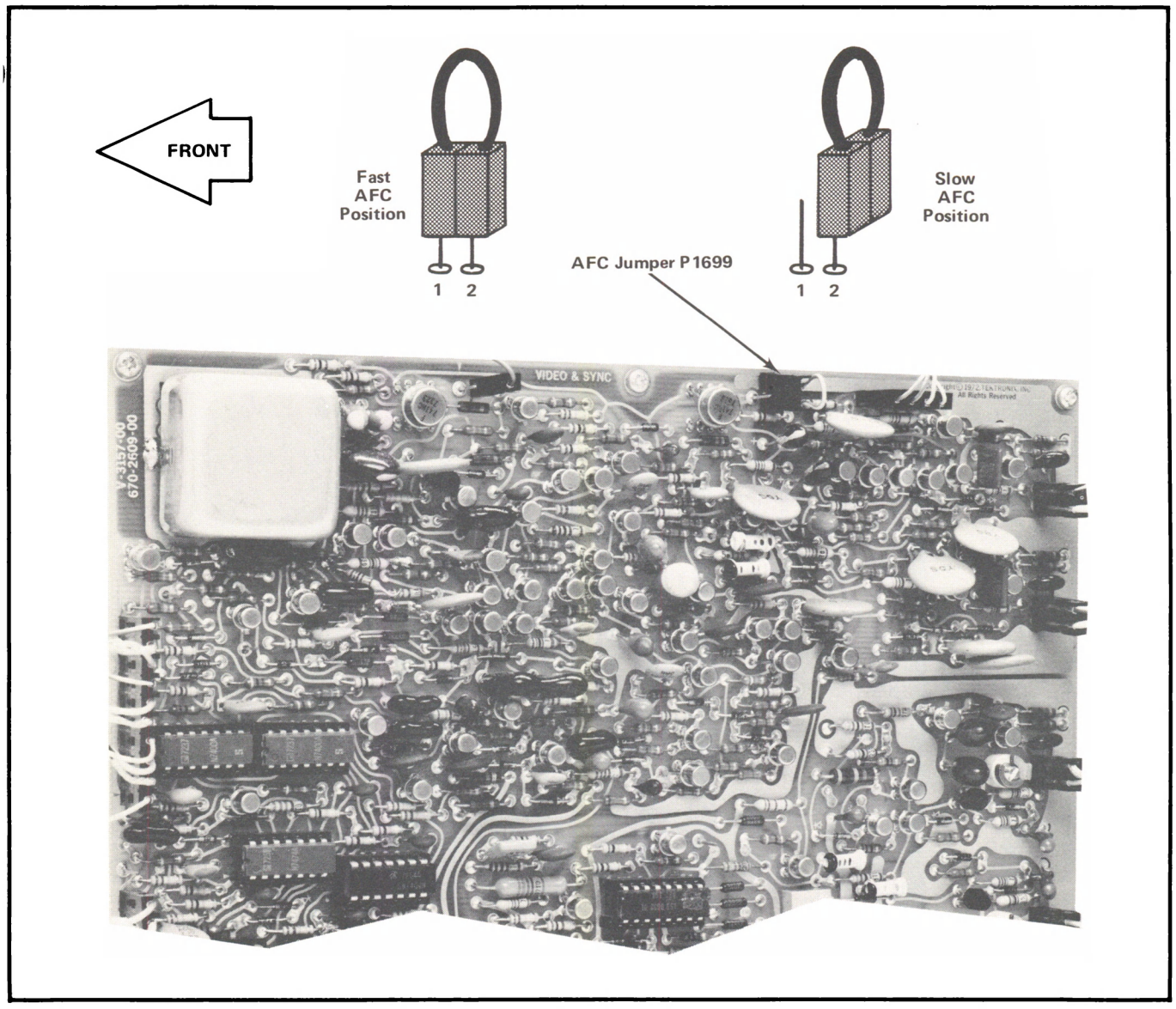


Fig. 4-4. Right side view, upper center portion of monitor, showing location of the AFC jumper on the Video Input & Sync circuit board.

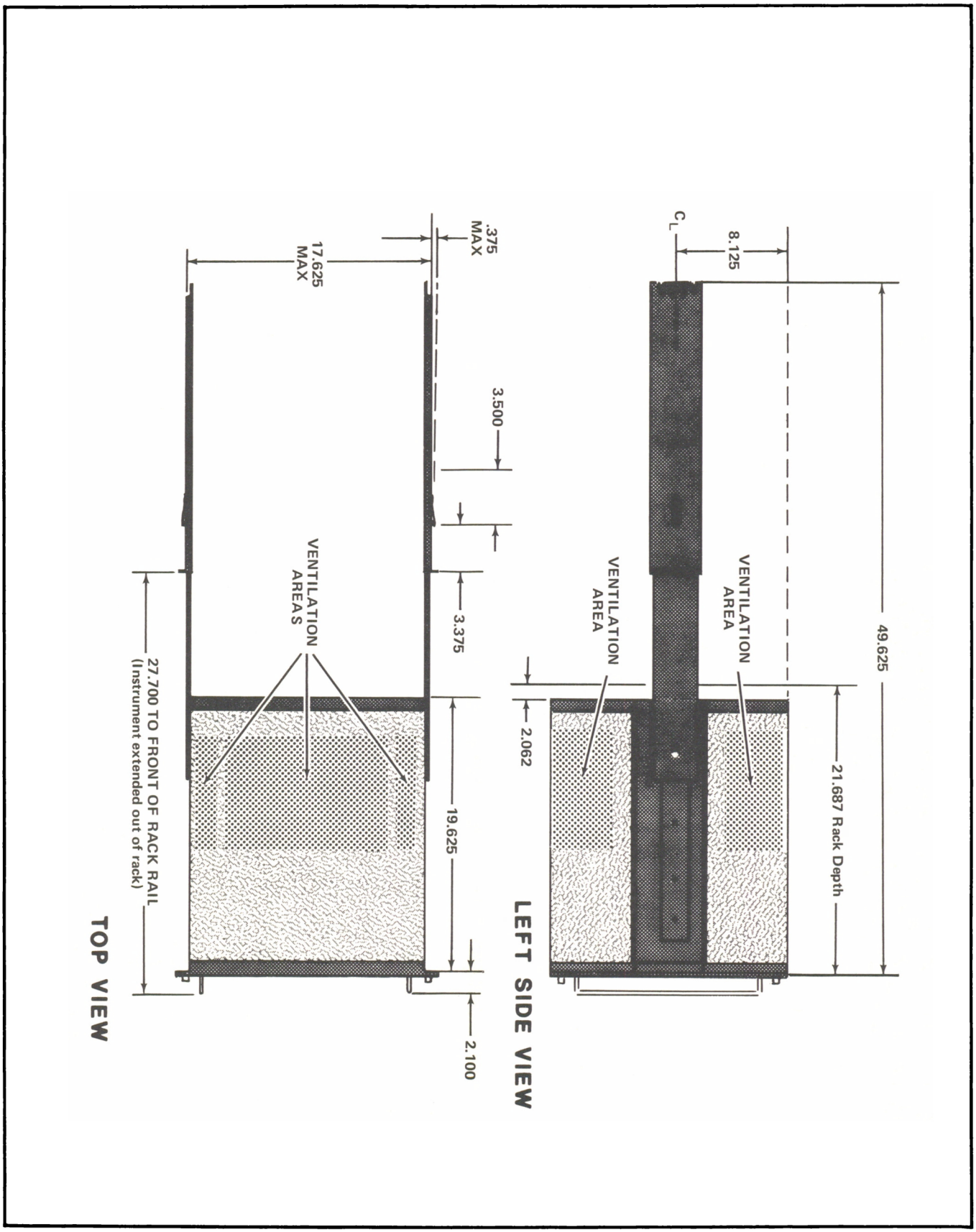


Fig. 4-5. Instrument and slide-out track assemblies, showing dimensions and ventilation areas.

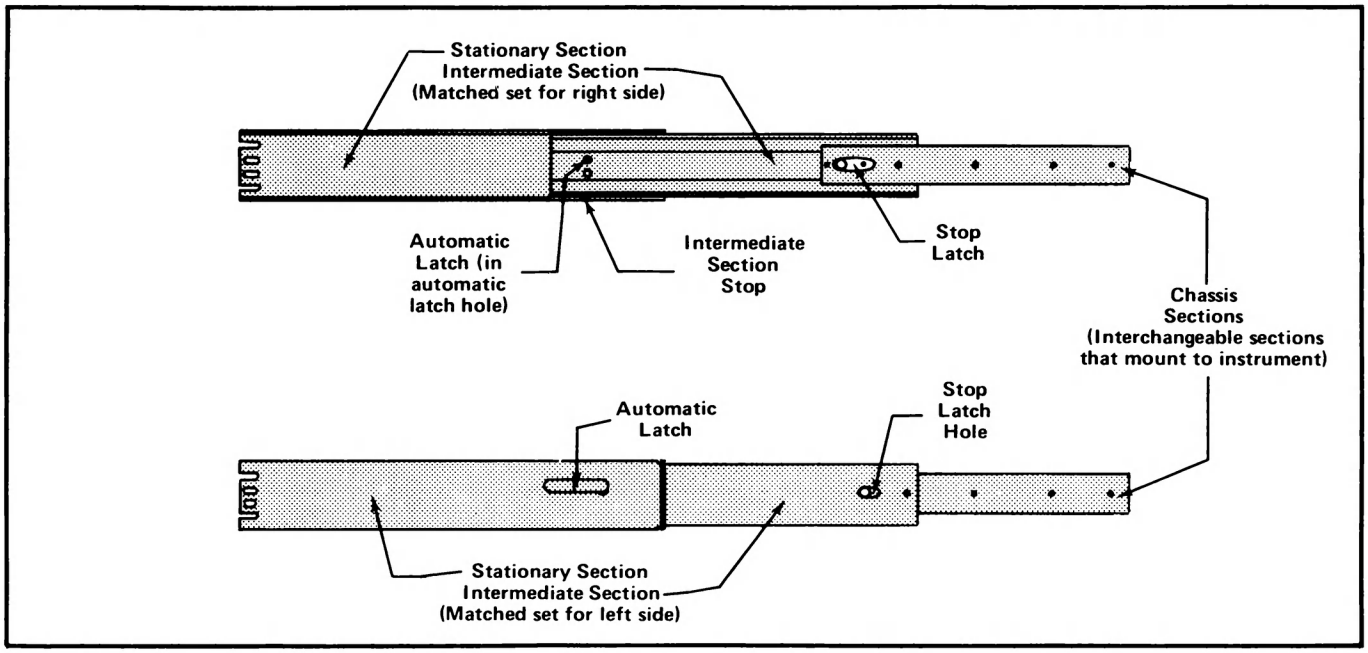


Fig. 4-6. Illustration showing the slide-out track assemblies.

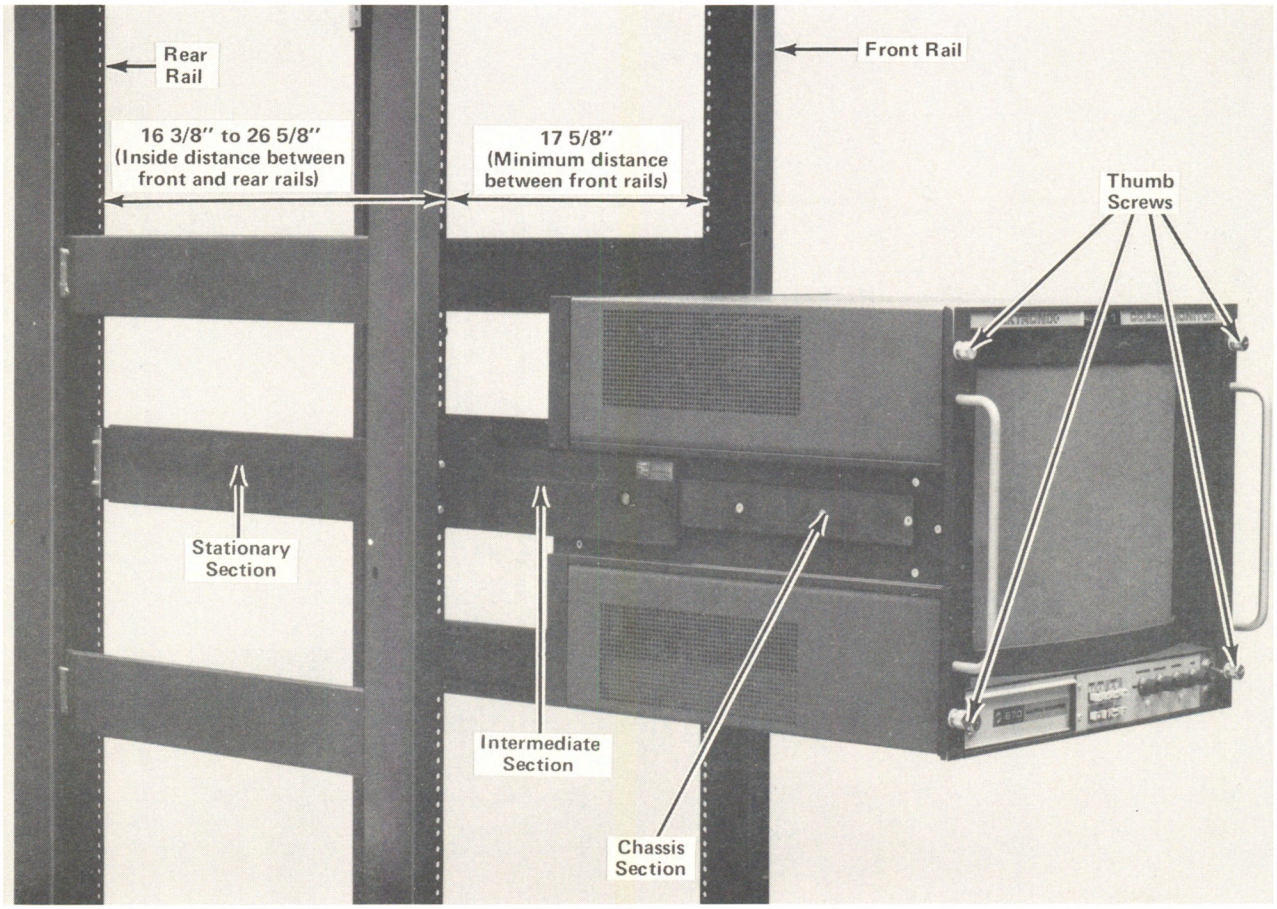


Fig. 4-7. The monitor shown in the fully extended position. The cabinet rack side panels have been removed from the rack to show mounting details.

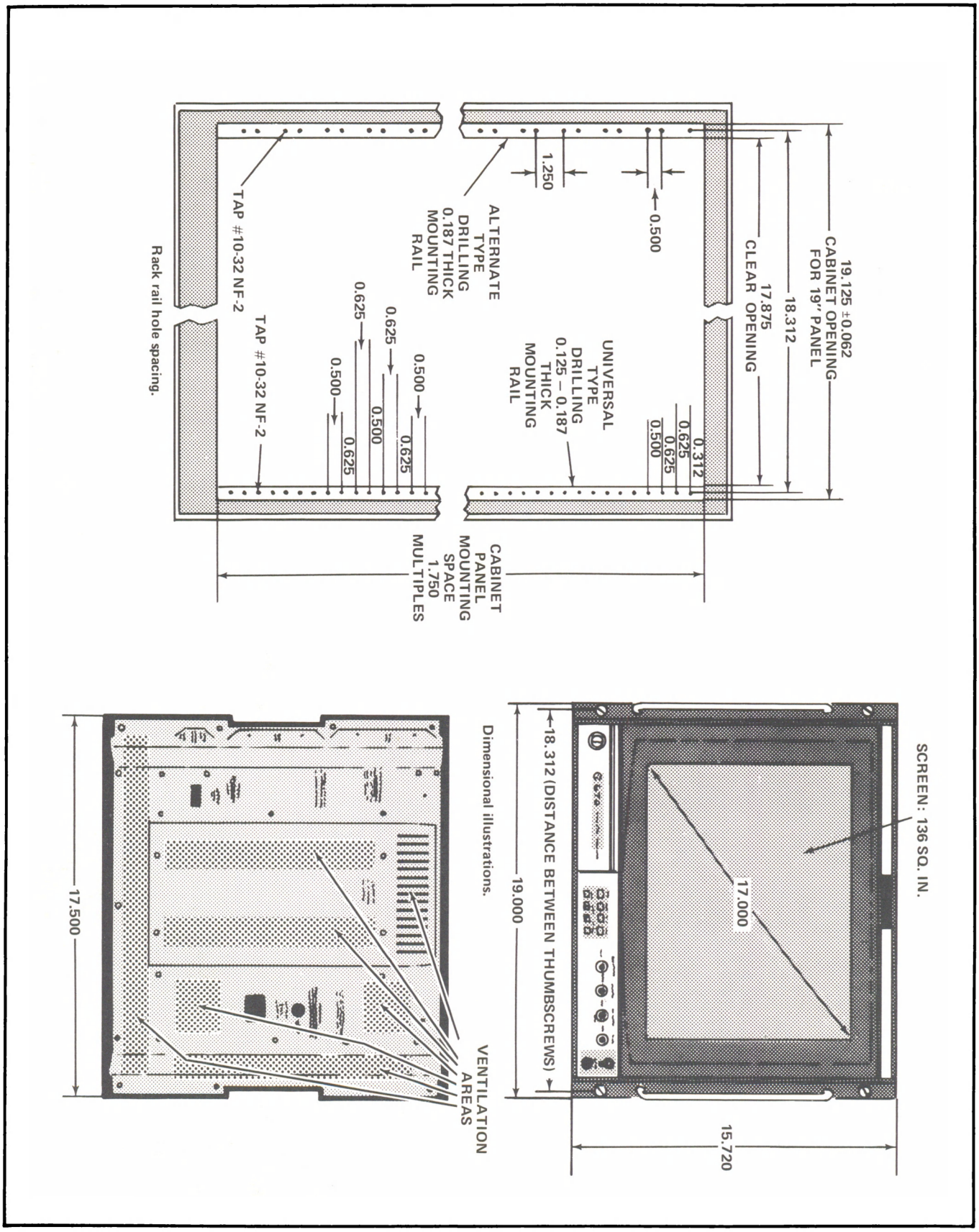


Fig. 4-8. Standard cabinet rack-rail hole spacings and instrument dimensions, showing rear ventilation areas.

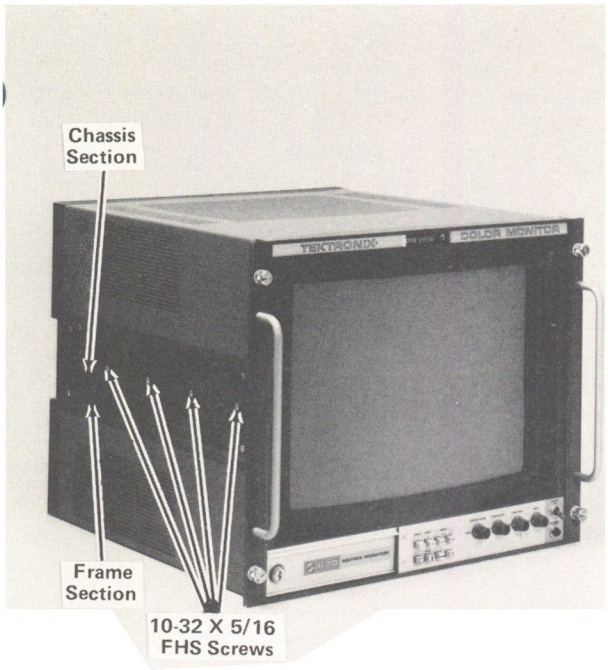


Fig. 4-9. Mounting the chassis sections on the monitor. Use the upper set of screw holes in the frame section.

CABINET TO RACKMOUNT CONVERSION

Mount the chassis sections of the slide-out tracks on the left and right sides of the monitor, using the upper set of mounting holes (see Fig. 4-9). Use eight 10-32 X 5/16 FHS screws. Before tightening the screws, check that the chassis sections are positioned parallel to the frame sections of the instrument.

Remove the bottom dust cover from the instrument and remove the rubber feet. Reinstall the dust cover.

RACKMOUNTING IN A CABINET RACK

Rack Width

The monitor fits most 19-inch wide racks and consoles whose front and rear rails conform to Universal, EIA, and Western Electric hole spacing. Refer to the rack-rail hole spacing illustration provided in Fig. 4-8.

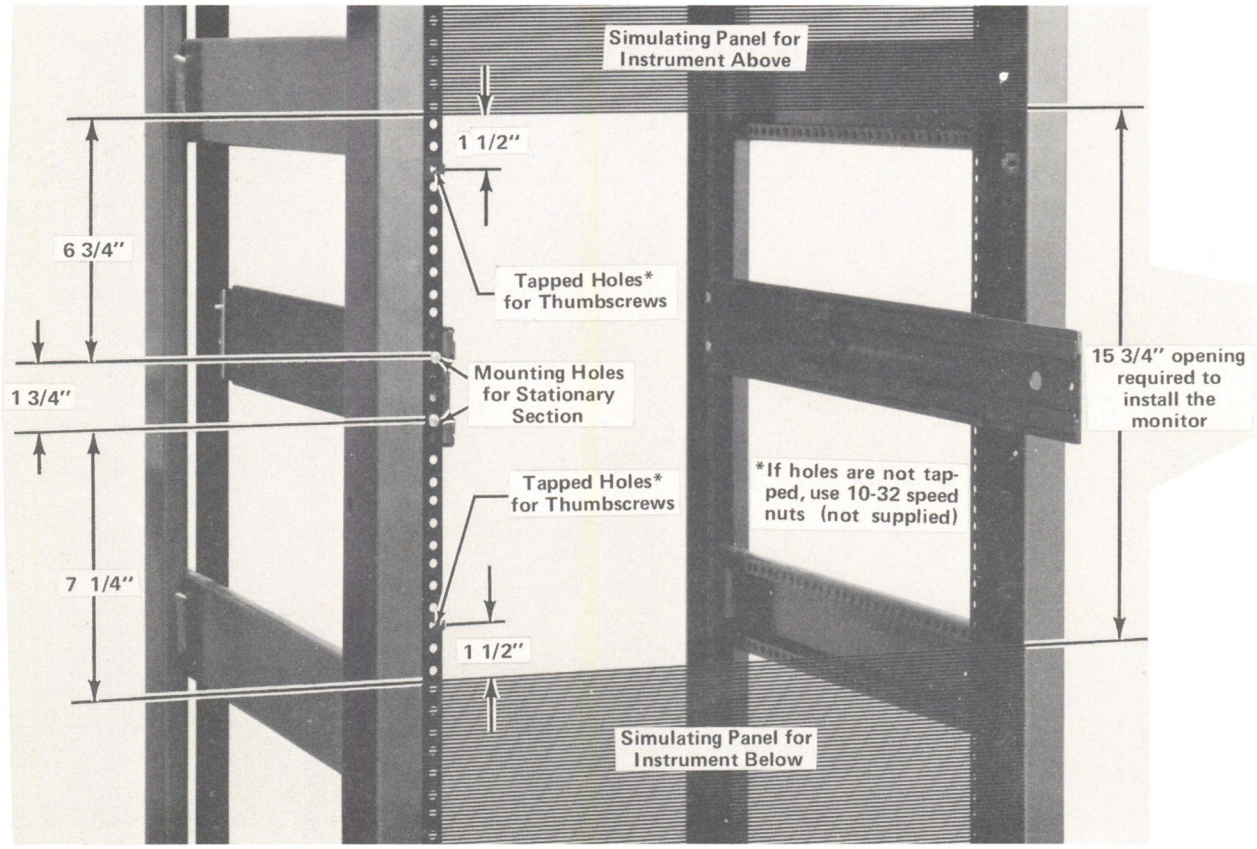

Simulating Panel for Instrument Above
1 1/2"
6 3/4"
Tapped Holes* for Thumbscrews
1 3/4"
Mounting Holes for Stationary Section
15 3/4" opening required to install the monitor
*If holes are not tapped, use 10-32 speed nuts (not supplied)
Tapped Holes* for Thumbscrews
7 1/4"
1 1/2"
Simulating Panel for Instrument Below

Fig. 4-10. Vertical mounting position of the left stationary section and location of the holes that accept the monitor thumbscrews. These same dimensions apply to the right front rail.

The dimension or opening between the front rails must be at least 17 5/8 inches (see Fig. 4-7) for a rack in which the front lip of the stationary section mounts behind an untapped front rail as shown in Fig. 4-11. This dimension allows space on each side of the instrument for the slide-out tracks to operate freely.

Rack Depth

Allow at least 2 inches clearance behind the rear of the instrument and any enclosure of the rack for sufficient cool air circulation. The dimensional illustrations (Figs. 4-5 and 4-8) show the ventilation areas for the monitor.

The slide-out tracks easily mount to the cabinet rack front and rear vertical mounting rails if the inside distance between the front and rear rails is within 16 3/8 to 26 5/8 inches (see Fig. 4-7).

Mounting Procedure

1. To mount the instrument directly above or below another instrument in the cabinet rack, select the appropriate holes in the front rack rails for the stationary sections. Use Fig. 4-10 as a guide.

NOTE

The next two steps describe how to mount the slide-out tracks to untapped rack rails. If the rack rails are tapped for 10-32 screws, you can mount the slide-out tracks in front of the rack rails, using the pan head screws. The bar nuts are not needed.

2. Mount the stationary sections to the untapped front rack rails using either of these methods:

a) If the front rails are not countersunk, use the pan head screws and bar nuts to mount the stationary sections (see Fig. 4-11).

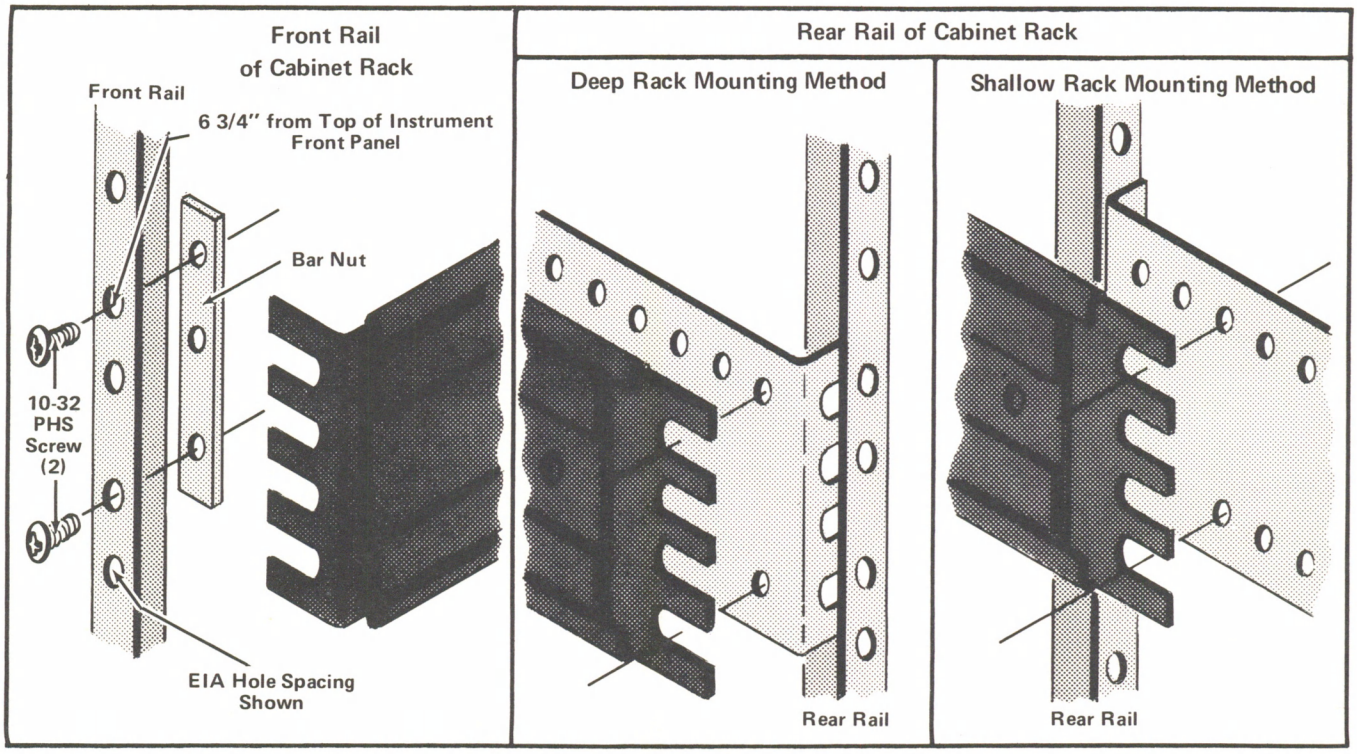


Fig. 4-11. Mounting the left stationary section to the rails of the cabinet rack.

b) If the front rails are countersunk, use the flat head screws and bar nuts to mount the stationary sections.

3. Mount the stationary sections to the untapped rear rails using the following method:

Mount the left stationary section with hardware provided as shown in Fig. 4-11. Note that the rear mounting bracket can be installed either way so that the slide-out tracks will fit either a deep or a shallow cabinet rack. Use the illustrations as a guide for mounting the right stationary section. Make sure that the stationary sections are horizontally aligned so that they are level and parallel with each other.

Adjustments

To adjust the slide-out tracks for smooth operation, proceed as follows:

1. Insert the instrument into the rack as described and shown in Steps 1 through 4 of Fig. 4-12 under "TO INSTALL".

2. Adjust the slide-out tracks for proper spacing by pulling the instrument outward until the front of the instrument protrudes about 10 inches from the rack. Then, slightly loosen the screws that fasten the slide-out track stationary sections to the front rails of the rack. Allow the slides to seek their proper width. Check that the instrument is centered, and retighten the screws.

Maintenance

The slide-out tracks do not require lubrication. The special dark-gray finish on the sliding parts is a permanent lubricative coating.

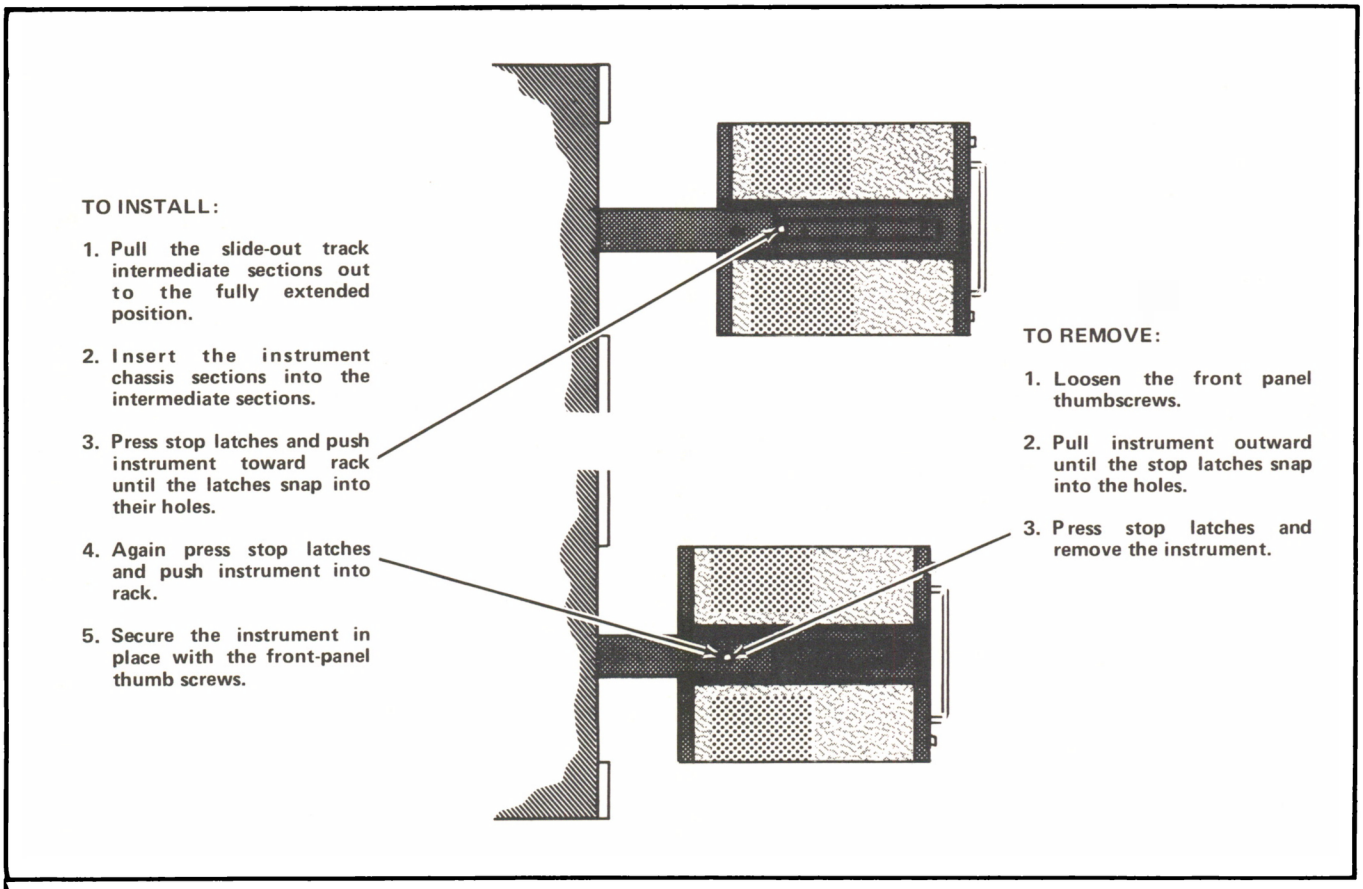

TO INSTALL:
1. Pull the slide-out track intermediate sections out to the fully extended position.
2. Insert the instrument chassis sections into the intermediate sections.
3. Press stop latches and push instrument toward rack until the latches snap into their holes.
4. Again press stop latches and push instrument into rack.
5. Secure the instrument in place with the front-panel thumb screws.
TO REMOVE:
1. Loosen the front panel thumbscrews.
2. Pull instrument outward until the stop latches snap into the holes.
3. Press stop latches and remove the instrument.

Fig. 4-12. Installing and removing the instrument.

MAINTENANCE

The maintenance information contained in this section falls into three categories: Preventive Maintenance, Troubleshooting, and Corrective Maintenance.

Preventive Maintenance includes inspection, cleaning, lubrication, and recalibration. Troubleshooting contains information for isolating a trouble to a component. Corrective Maintenance includes procedures for removing and replacing components.

PREVENTIVE MAINTENANCE

A regular schedule of preventive maintenance can improve instrument reliability. How often the preventive maintenance schedule is performed should be determined by the severity of the operating environment.

Visual Inspection

Visually inspect the instrument during the preventive maintenance routine for such defects as broken connectors, loose or disconnected pin connectors, improperly seated transistors and integrated circuits, and damaged components.

The corrective procedure for most visible defects is obvious; however, care must be taken to determine and correct the cause of the heat-damaged components. Heat damage is frequently an indication of trouble elsewhere in the instrument.

Multi-pin Connector Identification

Most inter-circuit connections between the circuit boards or between boards and chassis-mounted components are made through multi-pin connectors. The connector holder has identification numbers that identify terminal connector No. 2 and up. A triangular key symbol is used to identify terminal connector No. 1. This symbol is also located on the circuit board to identify pin No. 1 (see Fig. 5-1) so that the connector holder can be properly orientated.

Cleaning

Dust accumulating in the instrument acts as an insulating blanket, preventing heat dissipation, and possibly causing overheating and component breakdown. Accumulated dust can also provide an electrical conduction path, especially under high humidity conditions.

CAUTION

Avoid the use of chemical cleaning agents that might damage the plastics used in this instrument. Avoid chemicals that contain benzene, toluene, xylene, or similar solvents.

Exterior. Remove accumulated dust with a soft cloth or small paint brush. The brush is particularly useful around the front-panel controls.

The remaining dust can be removed with a soft cloth, dampened in a mild detergent and water solution. Do not use abrasive cleaners.

Kinescope. Clean the kinescope face and bezel with a soft, lint-free cloth dampened with mild detergent and water. Repeat with a cloth dampened with water only.

Interior. The best way to remove accumulated dust inside the instrument is to blow it off with dry, low-velocity air. Remaining dust can be removed with a small paint brush followed by a soft cloth dampened in a mild detergent and water solution. A cotton-tipped applicator is useful in tight places.

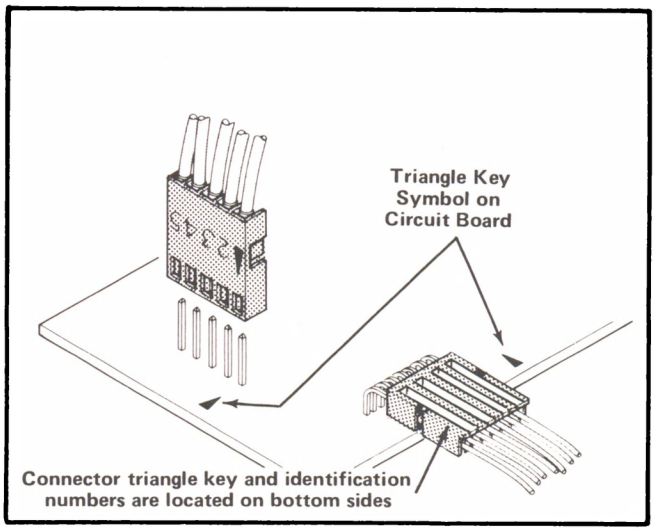


Fig. 5-1. Multi-pin circuit board connector.

Transistor and Integrated Circuit Checks

Periodic transistor and integrated circuit checks are not recommended. The best performance check for these devices is actual operation of the instrument. Performance of the circuit is thoroughly checked during the performance check or calibration procedure. Any sub-standard transistors or integrated circuits will usually be detected at that time.

Recalibration

The length of time between recalibration depends on the amount of use the instrument receives, the nature of the environment, and the change in performance when some components are replaced.

In general, a partial recalibration is necessary if the components replaced affect the calibration of a portion of the instrument. Complete recalibration is recommended if the instrument is not operating at its full capability, or if the kinescope or power transformer is replaced. To ensure correct and accurate instrument operation the instrument performance should be checked at regular intervals; for example after 1000 hours of operation if used continuously or every 6 months if used infrequently.

The Performance Check and Adjustment Procedures are given in Section 6.

Internal Fuses

There are three fuses (located internally) in the instrument as follows:

1. F8851. This is a fast-blow fuse for the +120-volt supply, located on the LV Heat Sink board (see Fig. 5-8).

2. F8825. This is a fast-blow fuse for the +15-volt and +5-volt supplies, also located on the LV Heat Sink board (Fig. 5-8).

3. F5042. This is a fast-blow fuse for the Horizontal Deflection circuit, located on the Deflection board (see Fig. 5-9).

To remove a fuse, push on one end so that the fuse will slide out of its holder (see Fig. 5-2).

See the Replaceable Electrical Parts list for fuse description and current Tektronix Part Number.

Service Available

Tektronix, Inc. provides complete instrument repair and calibration at Field Service Centers and at the Factory Service Center. Contact your nearest Tektronix Field Office or representative for further information.

TROUBLESHOOTING

The following is provided to augment information contained in other sections of this manual when troubleshooting a 670A-Series instrument. The schematic diagrams, circuit description, and calibration sections should be used to full advantage.

Troubleshooting Aids

Circuit Description. The circuit description for each schematic diagram is provided in Section 7 and the circuit board illustrations are provided in Section 10. Used in conjunction with the block diagram and test point waveforms, the information provided is helpful when analyzing circuit operation.

Diagrams. Circuit diagrams are given on the foldout pages in Section 10. The circuit number and electrical value of each component in this instrument are shown on the diagrams. Important waveforms are also shown.

Circuit Boards. The circuit boards used in the 670A-Series instrument are outlined on the schematic diagrams. Circuit board illustrations are provided on the back of the foldout pages that precede the relevant diagrams. The assembly number assigned to the circuit board is an abbreviated method for identifying the boards. Fig. 5-8 and 5-9 show the physical location of the boards along with the assembly numbers.

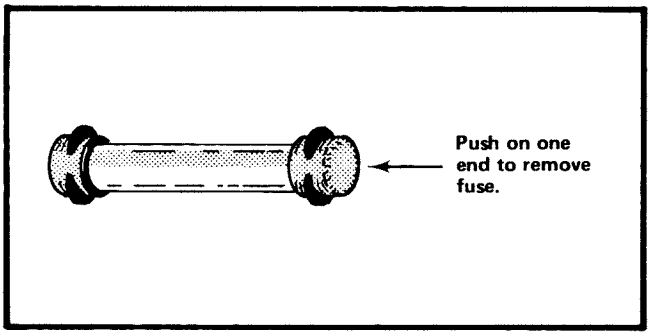


Fig. 5-2. Removing an internal fuse.

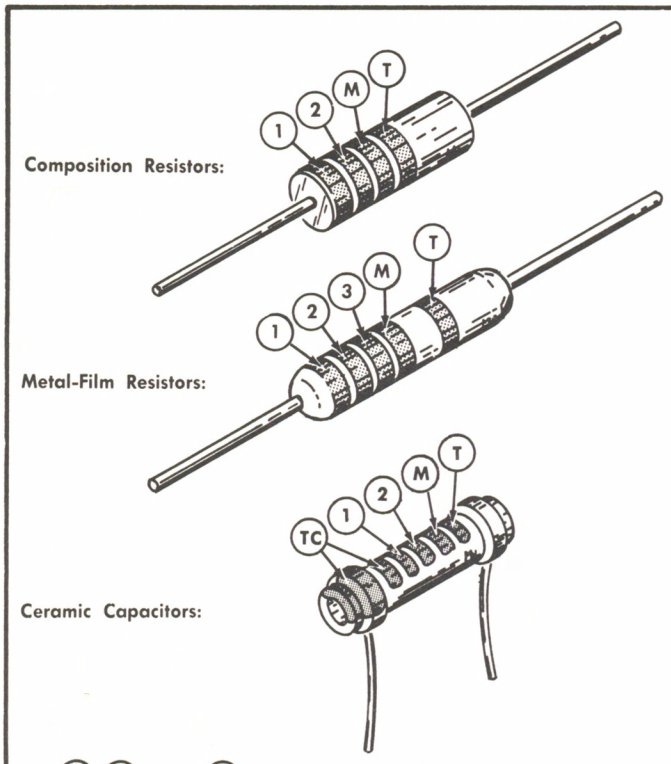
Circuit Board Illustrations. Each circuit board is illustrated in the Diagrams section.

For an example, refer to the NTSC Decoder circuit board which is illustrated on the back of the Sync & Timing diagram foldout page. Circuit numbers for this board are assigned on a grid system. The lower left corner of this board has been assigned numbers around 2001 proceeding from left to right, the numbers increase toward 2910. From left to right across the top of the board, the numbers increase from around 2091 toward 2981. Using this method, the physical location of each component can be found quickly.

Chassis-Mounted Components. Figures 5-8 and 5-9 show the locations of the following chassis-mounted components: Q6481, C8493, T8891, Q5001, Q5030, CR5020, and CR5021.

Wire Color Code. All insulated wires used for interconnection in the instrument are color-coded to facilitate tracing a wire from one point to another.

Resistor Color Code. Colored stripes on resistors signify electrical values, tolerances, etc. according to the EIA standard color code (see Fig. 5-3). Resistors not color coded usually have the value imprinted on the body.



Resistor and Capacitor Color Code

Color	Significant Figures	Multiplier: Resistors	Multiplier: Capacitors	Tolerance: Resistors	Tolerance: Capacitors
Silver	---	10^{-2}	---	±10%	---
Gold	---	10^{-1}	---	±5%	---
Black	0	1	1	---	±20% or 2 pF*
Brown	1	10	10	±1%	±1% or 0.1 pF*
Red	2	10^{2}	10^{2}	±2%	±2%
Orange	3	10^{3}	10^{3}	±3%	±3%
Yellow	4	10^{4}	10^{4}	±4%	+100% −0%
Green	5	10^{5}	10^{5}	±0.5%	±5% or 0.5 pF*
Blue	6	10^{6}	10^{6}	---	---
Violet	7	---	---	---	---
Gray	8	---	10^{-2}	---	+80% −20% or 0.25 pF*
White	9	---	10^{-1}	---	±10% or 1 pF*
(none)	---	---	---	±20%	±10% or 1 pF*

*For capacitance of 10 pF or less.

(1) (2) and (3) —1st, 2nd and 3rd significant figures;
(M) —multiplier; (T) —tolerance;
(TC) —temperature coefficient.

NOTE: (T) and/or (TC) color code for capacitors depends upon manufacturer and capacitor type. May not be present in some cases.

Fig. 5-3. Color Code for resistors and ceramic capacitors.

Capacitor Markings. The capacitance value of a common disc capacitor or small electrolytic is usually marked in microfarads on the side of the component body. The white ceramic capacitors used in the instrument are color-coded in picofarads using a modified EIA code (see Fig. 5-3). The "tear drop" capacitors are color-coded in picofarads using a modified EIA code, with the dot indicating both temperature and positive (+) side. See Fig. 5-4.

Transistor and Integrated Circuit Lead Configurations. Fig. 5-5 illustrates the lead configurations for the socket-mounted transistors, field effect transistors (FETs) and integrated circuits (ICs) used in the instrument.

IC Diagrams. The IC diagrams illustrate the positive logic function of the ICs. These diagrams are located in Section 10 of this manual.

Troubleshooting Equipment

The following signals and equipment are useful for troubleshooting the 670A-Series instrument.

1. Signal. 1-V p-p composite video test signal—NTSC, 50 Hz PAL, 60 Hz PAL, or RGB, whichever is applicable for your picture monitor.

2. Test Oscilloscope. For viewing waveforms at various test points in the circuit. Frequency response: dc to at least 10 MHz. It should be equipped with a 10X probe.

3. DVM and Ohmmeter. For measuring dc voltages and resistances accurately. A TEKTRONIX DM 502 in a TM 500 Series mainframe, or equivalent, is recommended for measuring voltages. The ohmmeter is required for checking continuity and resistance.

Rated Voltage VDC 25°C	Color	CODE FOR CAPACITANCE IN PICOFARADS		
		1st Figure	2nd Figure	Multiplier—pF
4	Black	0	0	None
6	Brown	1	1	X 10
10	Red	2	2	X 10^2
15	Orange	3	3	X 10^3
20	Yellow	4	4	X 10^4
25	Green	5	5	X 10^5
35	Blue	6	6	X 10^6
50	Violet	7	7	X 10^7
	Gray	8	8	
3	White	9	9	

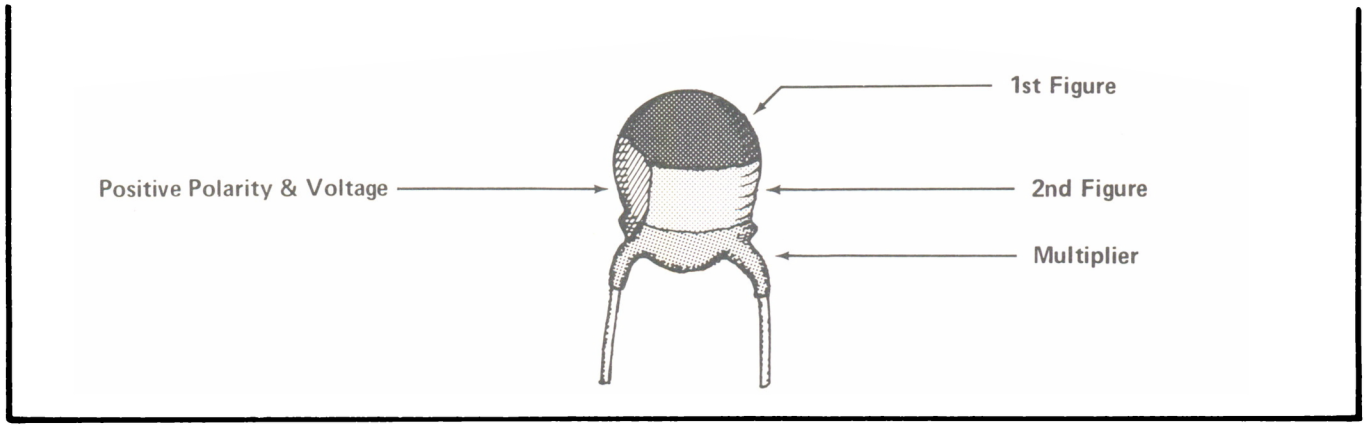


Fig. 5-4. Color coding for dipped tantalum "tear drop" capacitors.

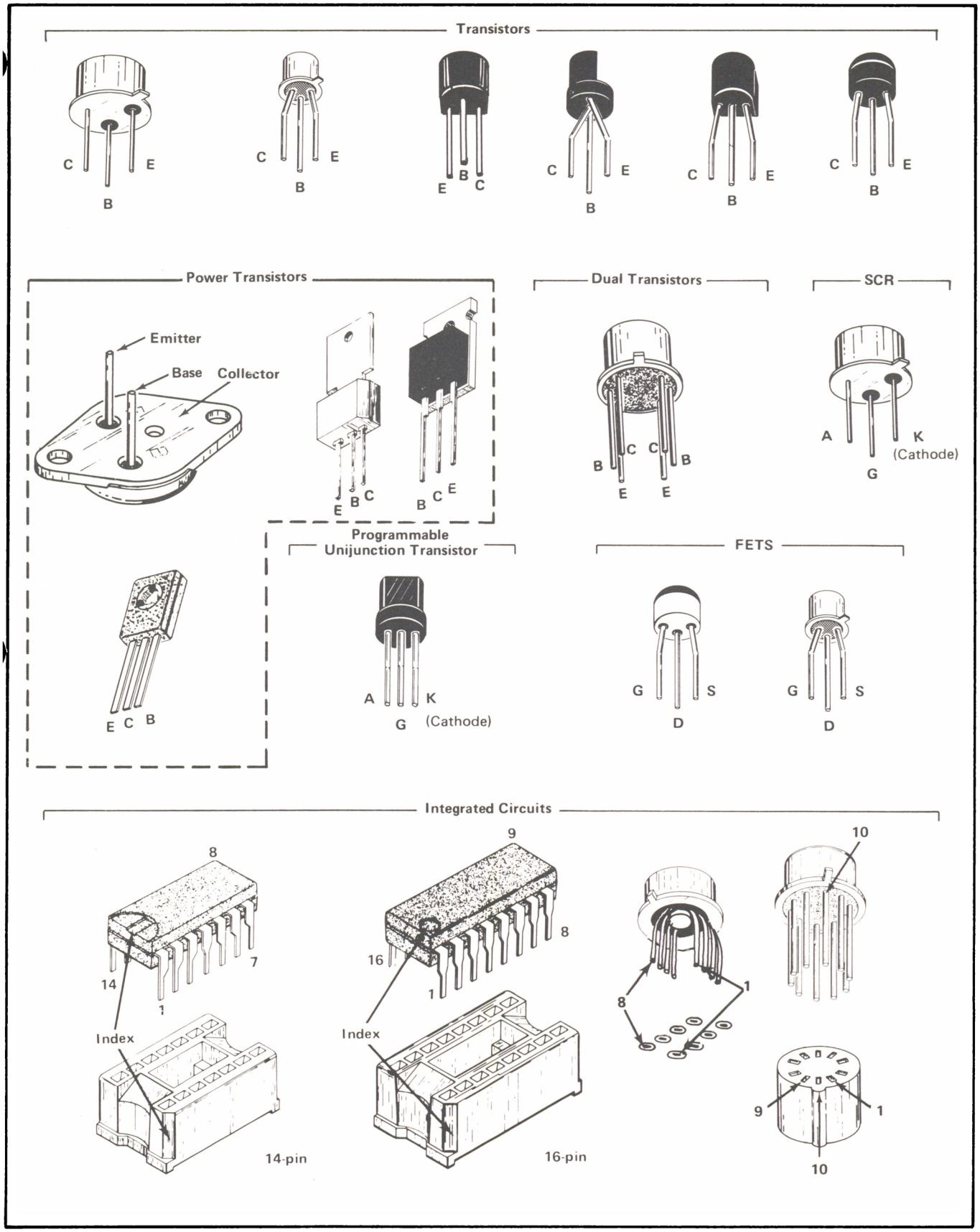


Fig. 5-5. Basing diagram for semiconductors.

4. Semiconductor Tester. Some means of testing the transistors, diodes, and FETs used in this instrument is helpful. A transistor-curve tracer such as the TEKTRONIX Type 576 will give the most complete information.

Troubleshooting Procedure

This procedure is arranged in a sequence that checks the simple trouble possibilities first.

1. Check Control Settings. Incorrect control settings or wrong internal jumper positions can indicate a trouble that does not exist. If there is any question about the correct function or operation of any control or jumper, refer to the Operating Instructions (Section 2) and Installation (Section 4).

2. Check Associated Equipment. Before trouble-shooting the instrument, check that the applied signal is correct and properly connected. Check that the probe, if used, is properly compensated and not defective.

3. Isolate Trouble to a Circuit. If the 670A-Series instrument is at fault, isolate the trouble to a circuit by noting the trouble symptoms. This can be accomplished by using the front panel controls and observing the crt display to identify the nature of the trouble. Then use Steps 4 through 6 to isolate the trouble to the probable cause such as a defective component or connection.

4. Visual Check. Visually check the portion of the instrument in which the trouble is suspected. Some troubles can be located by checking for unsoldered connections, broken wire, loosely-seated transistors, loose-fitting connectors, damaged components, or damaged circuit boards.

5. Check Voltages and Waveforms. Often the defective component or stage can be located by checking for correct voltage or waveform in the circuit. Typical waveforms are given near the diagrams. To obtain operating conditions similar to those used to take these waveforms, refer to the instructions at the start of the Diagrams section.

CAUTION

Because of component density on circuit boards, care should be taken with meter leads and probe tips. Accidental shorts can cause abnormal voltages or transients that may destroy components. "Ground Lugs" are not always at ground potential. Check the diagrams before using such connections as ground for meter prods or oscilloscope probes. Some transistor cases may be elevated.

6. Check Individual Components. When you have isolated the trouble to one circuit or stage, the next step is isolate the trouble to one component or part. Components that are soldered in place are best checked by disconnecting one end to isolate the measurement from the effects of surrounding circuitry. The following methods are provided for checking individual electrical components in the instrument.

a. Transistors. The best check of transistor operation is actual performance under operating conditions. If a transistor is suspected of being defective, it can be checked by substituting a new component or one which has been checked previously. However, be sure that the circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic tester (such as the TEKTRONIX Type 576) to check the transistor.

b. Integrated Circuits. Integrated circuits should not be replaced unless they are actually defective. The best method for checking these devices is by direct substitution with a new component or one which is known to be good. Be sure that circuit conditions are not such that a replacement component might be damaged.

c. Diodes. All diodes can be checked for an open or shorted condition by measuring the resistance between terminals. Use an ohmmeter, set to the 1 K scale to keep from damaging the diode, for measuring the diode resistance. The resistance should be very high in one direction and very low when the ohmmeter leads are reversed.

d. Resistors. Resistors can be checked with an ohmmeter. Check the Replaceable Electrical Parts list for the tolerance of the resistors used in the instrument. Resistors normally do not need to be replaced unless the measured value varies widely from the specified value.

e. Inductors & Switch Contacts. Check for an open circuit (that should normally be closed) by checking continuity with an ohmmeter.

f. Capacitors. A leaky or shorted capacitor can best be detected by checking the resistance with an ohmmeter on the highest scale. Do not exceed the voltage rating of the capacitor. An open capacitor can best be detected with a capacitance meter or by checking whether the capacitor passes ac signals.

CORRECTIVE MAINTENANCE

Corrective maintenance consists of component replacement and instrument repair. Special techniques required to replace components in this instrument are given here.

Soldering Techniques

WARNING

Disconnect the instrument from the power source before soldering.

Reliability and optimum performance of this instrument can be maintained only if proper soldering techniques are used when repairing or replacing parts. Soldering techniques that apply to maintenance of precision electronic equipment should be used when working on this instrument. Use only 60/40 rosin-core, electronic grade solder. The choice of soldering iron is determined by the repair to be made. When soldering on circuit boards, use a 10-to-25-watt pencil-type soldering iron with a 1/8-inch wide, wedge-shaped tip. Keep the tip properly tinned for best heat transfer to the solder joint. A higher wattage soldering iron may separate the etched wiring from the base material. Avoid excessive heat; apply only enough heat to remove the component or to make a good solder joint. Also, apply only enough solder to make a firm solder joint; do not apply too much solder. Use a desoldering tool or other device when it is necessary to remove excess solder.

The pencil-type soldering iron used on the circuit boards can be used for soldering to switch terminals, potentiometers, or metal terminals mounted in plastic holders. For ground lugs that are connected to the chassis, or other metal terminals that are connected to a large heat-radiating surface, use a high-wattage-rating soldering iron with a larger tip.

After soldering is completed, clean the area around the solder connection with a flux-remover solvent. Be careful not to remove any information printed in the area.

Location Guide for Replacing Parts

The exploded-view drawings associated with the Replaceable Mechanical Parts list (located at the rear of the manual) are helpful in the removal or disassembly of individual components or subassemblies. Circuit board illustrations are provided on the backs of foldout pages in the Diagrams section of this manual.

Semiconductor Replacement

Semiconductors should not be replaced unless they are actually defective.

CAUTION

The POWER switch must be turned off before removing or replacing semiconductors.

If the semiconductors are removed from their sockets during routine maintenance, return them to their original sockets. Unnecessary replacement of semiconductors may affect the calibration of this instrument. When semiconductors are replaced, check the operation of the parts of the instrument whose calibration may be affected.

If U1517 on the Video Input & Sync board is replaced, the values of R1405 and R1503 may also need to be changed. After replacing U1517, perform Step 9 in the Performance Check/Adjustment section of this manual. There are two separate procedures in this section (one for the 670A Monitor and one for the 671A Monitor). Use the procedure that applies to your instrument.

Replacement semiconductors should be of the original type or a direct replacement. Fig. 5-5 shows the lead configuration of the semiconductors used in this instrument. Some plastic-cased transistors have lead configurations that do not agree with those shown here. If a replacement transistor is made by a different manufacturer than the original, check the manufacturer's basing diagram for correct basing. All transistor sockets in this instrument are wired for the standard basing as used for metal-cased transistors. Power transistors that are mounted on the chassis use silicone grease to increase heat transfer. Replace the silicone grease when replacing these transistors.

WARNING

Handle silicone grease with care. Avoid getting silicone grease in the eyes. Wash hands thoroughly after use.

An extracting tool should be used to remove the 8-, 14-, and 16-pin integrated circuits to prevent damage to the pins. This tool is available from Tektronix, Inc. Order Tektronix Part Number 003-0619-00. If an extracting tool is not available when removing one of these integrated circuits, pull slowly and evenly on both ends of the device. Try to avoid having one end of the integrated circuit disengage from the socket before the other, as this may damage the pins.

Pin Connector Replacement

Circuit board pins, end-lead pin connectors, and multi-pin connectors are used to interconnect circuit boards and power transistors in the instrument.

NOTE

A circuit-board pin replacement kit including necessary tools, instructions and replacement pins is availabe from Tektronix, Inc. Order Tektronix Part Number 040-0542-00.

Circuit Board Pins. To replace a pin that is mounted on a circuit board, first disconnect the multi-pin connector. Then, unsolder the damaged pin and pull it out of the circuit board with a pair of pliers. Be careful not to damage the etched wiring on the board with too much heat. Ream out the hole in the circuit board with a 0.031-inch drill. Press the new pin into the hole in the circuit board. Position the pin in the same manner as the old pin. Then, solder the pin on both sides of the circuit board.

End-Lead Pin Connectors. End-lead pin connectors are used at the ends of the wire leads that mate with circuit board pins and power transistor leads. When several end-lead pin connectors are mounted in a plastic holder, this arrangement is called a multi-pin connector. Table 5-1 lists three basic sizes of end-lead pin connectors for replacement use in the instrument.

Table 5-1

END-LEAD PIN CONNECTORS

Description	Tektronix Part No.
Used with 0.150-inch pin spacing connector holder:	
For 28 to 32 AWG wire.	131-0622-00
For 22 to 26 AWG wire and 50 Ω or 75 Ω subminiature coaxial cable braid and center conductor.	131-0621-00
For 18 AWG wire.	131-0792-00

To replace a damaged end-lead pin connector, remove the old pin connector by cutting the connector where the bare (stripped portion) wire is clamped. By doing this, you can avoid making the wire too short. Then, pull the wire out of the remaining attached portion of the connector. Cut the excessive material from the replacement connector. Clamp the replacement connector securely to the lead and insert the connector in its holder.

Circuit Board Replacement

If the circuit board is damaged beyond repair, replacement can be made of the entire assembly including all soldered-on components. Part numbers are given in the Replaceable Electrical Parts list of Section 9 for the completely wired board.

The following removal procedures are given for boards that are the most difficult to remove.

LV Power Supply Board.

1. Disconnect all the multi-pin connectors from the circuit board.

2. Desolder the transformer and ground leads where they enter the circuit board. Remove the two screws from C8493 to disconnect the wire leads.

3. Remove the 6-32 screws from the full-wave rectifiers. Remove two 6-32 nuts from the board mounting screws. Remove the board.

LV Power Transformer T8891

1. Remove the left frame section from the instrument.

2. Remove the two screws that go through the deflection board chassis to the transformer hold-down bracket.

3. Unsolder the ground strap and two wires where they connect to the transformer primary winding terminals.

4. Unsolder the transformer secondary winding wires where they connect on the LV Power Supply board.

5. Remove the four screws and lockwashers from the bolts that hold the transformer bracket. Remove the transformer assembly.

6. Install the replacement transformer by reversing the order of the removal steps.

Power Cord Conductor Identification

Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Blue	White
Grounding (Earthing)	Green-Yellow	Green-Yellow

Right Front-Panel Board

1. Disconnect the multi-pin connectors from the board.

2. Remove two 4-40 PHS screws from the panel. Remove the nuts and flat washers from the POWER and DEGAUSS switches.

3. Remove the right front-panel assembly.

4. Unsolder the OVERLOAD and UNCAL lamp leads from the board.

5. Remove the knobs, nuts, and flat washers from the variable controls. Lift off the panel.

6. Remove the 4-40 screws, nuts, and lockwashers that hold the pushbutton switch assemblies.

7. Desolder the variable controls from the board so that the board can be lifted off. Remove the circuit board.

Left Front-Panel Board

1. Remove two 4-40 PHS screws from the left front panel. Lift panel off.

2. Remove four 4-40 PHS screws from the left front-panel circuit board. Pull the board outward a short distance and remove all the multi-pin connectors to release the board.

Left Front-Panel Assembly

1. Remove the left handle assembly if not already removed. Partially unscrew the stop screw which is located on the left side of the monitor. This screw will let the left front panel open fully.

2. Using a pointed tool, push in the left spring-loaded hinge pin and move the left front panel slowly outward so that the hinge pin can be held. Place the hinge pins with springs in a container. Release the door spring from the center support bracket.

3. Disconnect the multi-pin connectors from the left front panel circuit board.

Kinescope (CRT) Replacement

WARNING

Use care when handling the kinescope. Protective clothing and safety glasses should be worn. Avoid striking it on any object which might cause it to crack or implode. When storing the kinescope, place it in a protective carton or set it face down in a protected location on a smooth surface with a soft mat under the face to protect it from scratches.

NOTE

When ordering a new crt, be sure to order double-sticky back tape (Tektronix Part No. 253-0188-00). See the Replaceable Mechanical Parts list in the rear of this manual for a complete description. This tape is used to mount the front deflection yoke support as described in Step 8.

1. With the instrument in the upright position, remove the rear heat sink assembly by removing six 8-32 X 3/4 PHS screws. These screws are located near the left and right edges of the assembly. Unplug the multi-pin connectors and place the heat sink assembly away from the instrument.

2. Set the instrument on its rear side. Remove the POWER and DEGAUSS switch mounting nuts and washers. Remove two 4-40 X 1/4 PHS screws from the right front panel. Remove the right front panel assembly by unplugging the multi-pin connectors.

3. Remove the tilt-out left front panel assembly by removing a 6-32 X 5/16 FHS screw and a 6-32 X 1/4 truss screw that hold the center bracket. Tape the panel hinge pins and springs so that they don't fall out.

4. Lift the spring-loaded top front panels outward and turn them 90°. Remove six (three at the top and three at the bottom) 6-32 X 1/4 PHS screws that hold the bezel.

5. Lay the instrument in its upright position. Move the bezel with attached tally light assembly to one side. Remove the POWER and DEGAUSS switch assembly by removing two 6-32 X 1/4 FHS screws from the right front frame. Unplug the degaussing coil connector that connects to the DEGAUSS switch.

6. Remove the kinescope socket. Note the position of the terminals on the vertical convergence coil. (The terminal where the red deflection wire is soldered should face downward.) Also, note the position of the coil itself and the static convergence magnet assembly on the neck of the kinescope. Slide these parts off the kinescope neck. (See Fig. 5-6.) Loosen the yoke clamp. Disconnect the anode connector by sliding a wedge-shaped plastic tool under the washer as shown in Fig. 5-7.

7. Carefully remove the four 5/16 X 1/2 hex head bolts that hold the kinescope to the frame. Gently remove the kinescope through the front of the monitor. While removing the kinescope, slide the deflection yoke off the neck of the kinescope. Lay the kinescope face down on a soft pad.

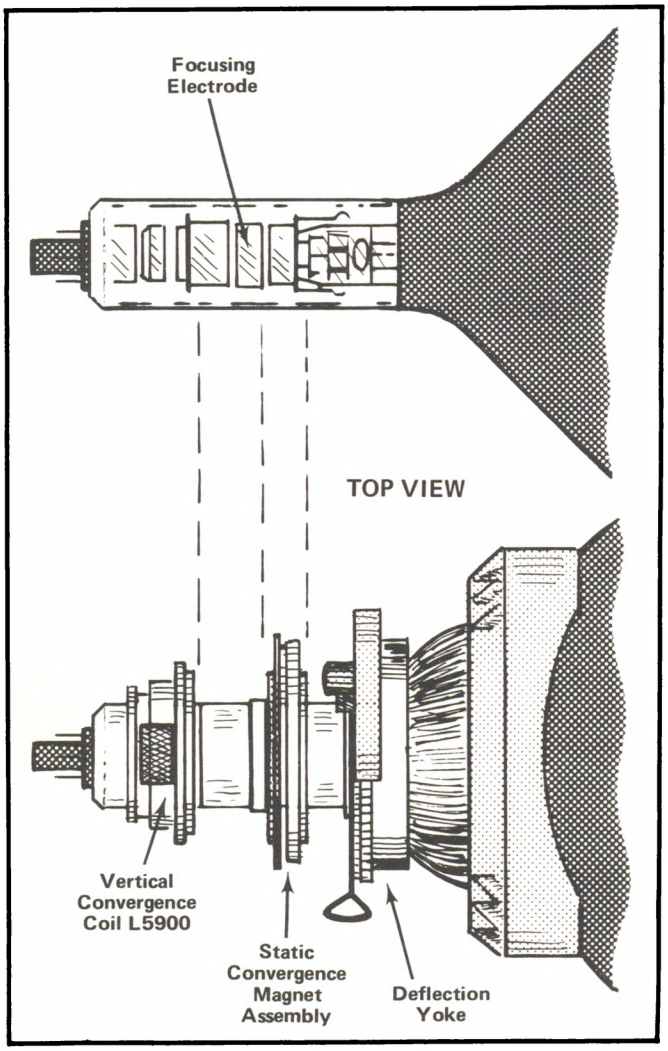


Fig. 5-6. Location of components on the neck of the kinescope.

8. Remove the new kinescope from its container and lay it face down on a soft pad beside the old kinescope. Remove the parts from the old kinescope and mount them in the same location on the new one.

Use one-inch long pieces of double-sticky back tape, which was ordered with the new kinescope, to mount the front deflection yoke support to the kinescope. Be sure that yoke support is properly positioned before firmly pressing it down.

9. Install the new kinescope in the monitor by reversing the order of the removal steps. Be sure that the kinescope anode is oriented toward the top side of the monitor. Check that the front frame of the monitor is square when tightening the hex head bolts that hold the kinescope to the frame.

NOTE

When connecting the anode connector to the kinescope, be sure that the convergence electrode contact spring is correctly positioned as shown in Fig. 5-7A. If the spring shorts to the anode contact, the display will be extremely misconverged and correct purity cannot be obtained.

Fig. 5-6 shows the location of the vertical convergence coil and static convergence magnet assembly on the neck of the kinescope.

10. After installing all removed parts and completing the electrical connections, check that the vertical convergence coil terminals are facing the direction noted in Step 6 of this procedure. Then, turn on the monitor and perform the deflection, convergence, and screen adjustment procedures provided in Section 2 of this manual.

Selecting Values for R6425 and R6426

If the kinescope or the encapsulated EHT circuit board assembly has been replaced, during recalibration you may find that the front panel HORIZONTAL STATIC CONVERGENCE control R7303 range is not centered. The range can be recentered by selecting the value of R6425 or R6426. Location of these resistors can be found on the Kine Supplies and Blanking circuit board illustration provided on the back side of diagram 13 (Convergence, Pincushion and Scan Failure).

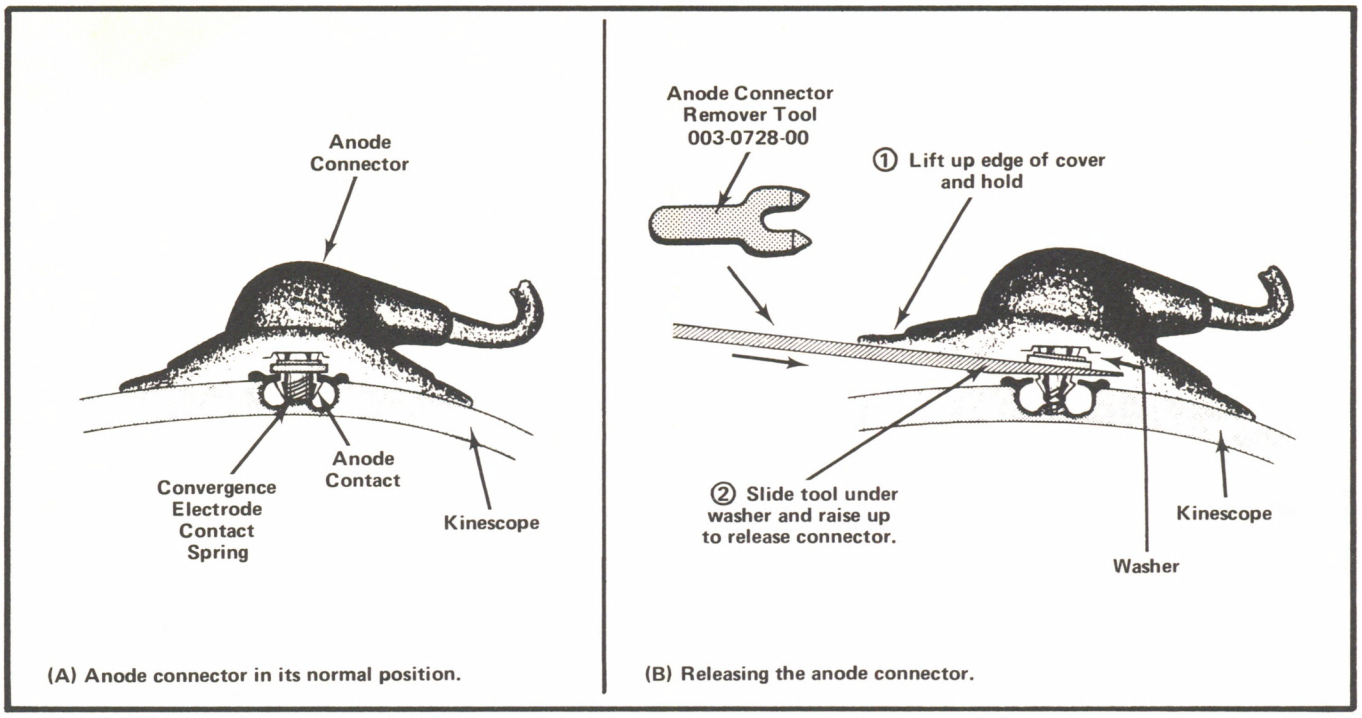


Fig. 5-7. Cross-section view of kinescope anode connector. A special plastic tool with a wedge-shape tip is used to release the anode connector.

High-Voltage Oscillator Tuning

Tuning should only be necessary if the high voltage power transformer T6371 is replaced. To tune the high voltage oscillator, display a 100 IRE flat field signal. Rotate the CONTRAST control from minimum toward maximum until the OVERLOAD lamp turns on. During this time a stable display should be observed. If not, choose from Table 5-2 a capacitor to solder in parallel with C6573 or C6473.

Table 5-2

CAPACITANCE VALUE LIST

Description	Tektronix Part No.
0.001 μF, 20%, 600 V	285-0501-00
0.0015 μF, −2%, +2%, 400 V	285-0504-00
0.0022 μF, 20%, 400 V	285-0543-00
0.0047 μF, 20%, 400 V	285-0506-00

INSTRUMENT REPACKAGING

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument serial number and a description of the service required.

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

1. Obtain a carton of corrugated cardboard having inside dimensions of no less than six inches more than the instrument dimensions; this will allow for cushioning. Refer to the following table for carton test strength requirements.

2. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.

3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between carton and instrument, allowing three inches on all sides.

4. Seal carton with shipping tape or industrial stapler.

SHIPPING CARTON TEST STRENGTH

Gross Weight (lb)	Carton Test Strength (lb)
0-10	200
10-30	275
30-120	375
120-140	500
140-160	600

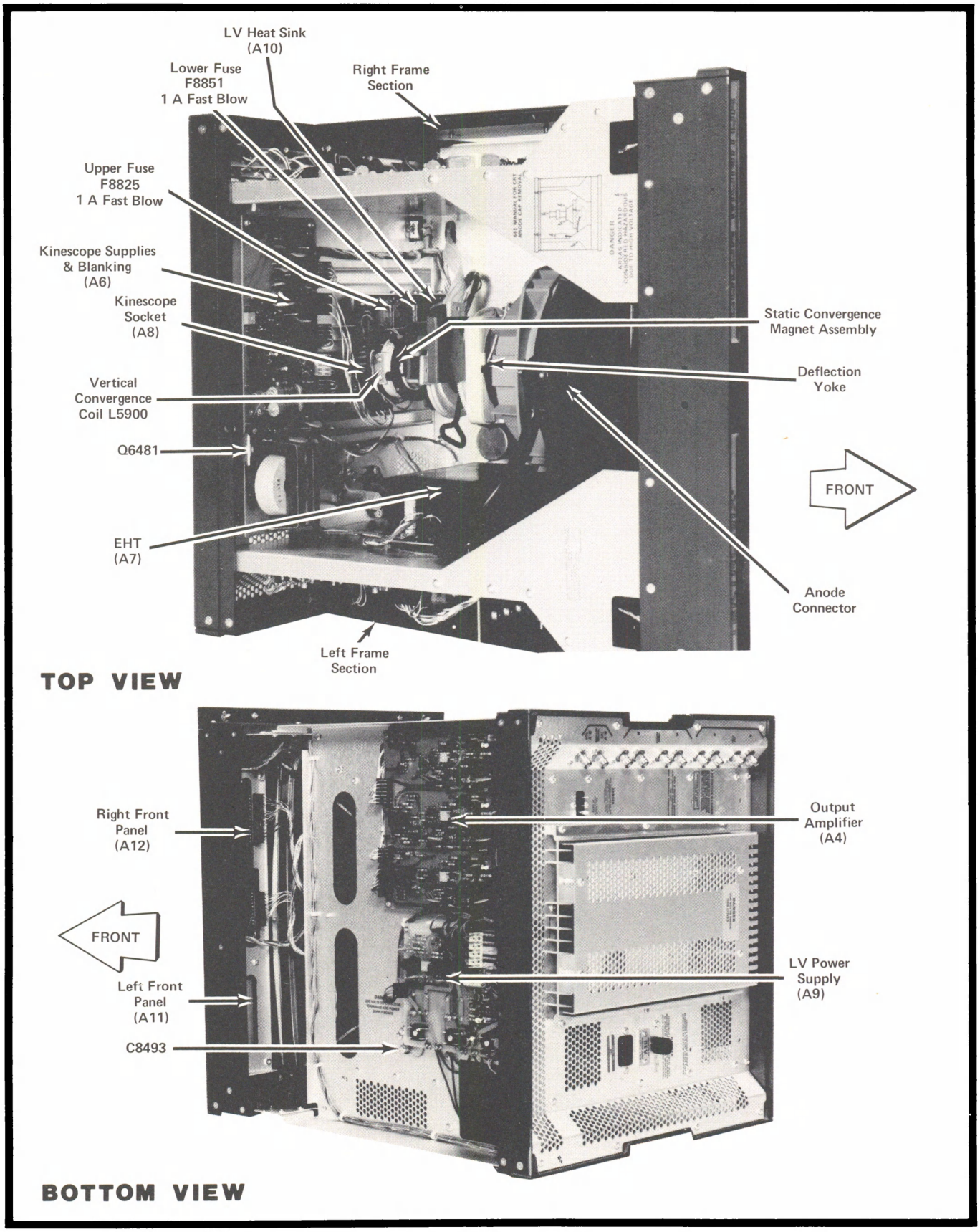


Fig. 5-8. Top and bottom views, showing locations of the circuit boards. Some chassis-mounted components and mechanical parts are also identified as an aid when using the component replacement procedures.

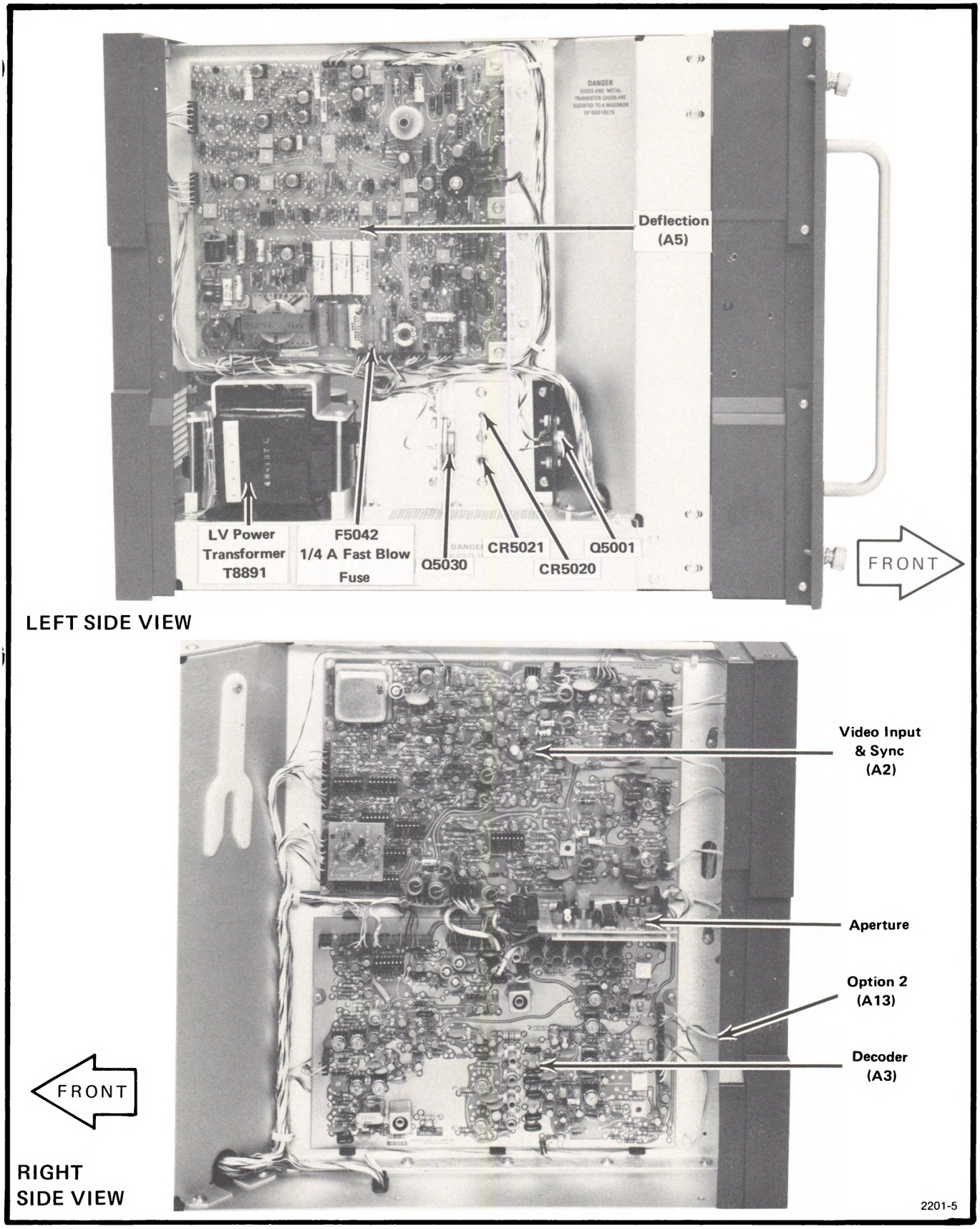


Fig. 5-9. Left and right side views, showing locations of the circuit boards and some chassis-mounted components. Left and right frame sections have been removed to provide unobstructed views of left and right sides.

PERFORMANCE CHECK/ADJUSTMENT

Introduction

This section of the manual contains two main procedures: (1) the Performance Check/Adjustment procedure for NTSC instruments, having an NTSC Decoder; (2) the Performance Check/Adjustment procedure for PAL instruments having a PAL Decoder. A procedure for checking and adjusting the Demodulated Chroma Output board (Option 2) is also included. If your instrument includes this option, and you are completely checking/adjusting the monitor, perform the procedure for this circuit board after you have completed either the NTSC or PAL procedure.

The shaded area on the edge of each page, labeled "NTSC", "PAL", or "OPTION 2" allows you to easily locate the procedure that you intend to use.

When a complete Performance Check procedure is performed, and the instrument meets or exceeds the performance requirement stated for each parameter, the instrument will meet the specification as described in Section 3 of this manual. All items listed in the Performance Requirement column of the instrument specification are tested in this procedure. Items listed in the Supplemental Information column are not verified in this manual; they are either explanatory notes, performance characteristics for which no limits are specified, or characteristics that are impractical to check on a routine basis, for example, Maximum Safe Input.

The Performance Check/Adjustment Procedure for the 670A (NTSC) Monitor is given first. Since the same circuits, except the Decoder, are used in the PAL monitors, only one Deflection, Convergence, and Screen procedure for these parameters is provided. This procedure can easily be adapted for use with the PAL monitors by applying the appropriate video generator signal to the monitor and using the proper linearity graticule.

670A and 671A front- and rear-panel controls and connector names, when used in the procedures, are fully capitalized (i.e., BRIGHTNESS control); internal adjustments are initial-letter capitalized (i.e., Brightness Preset, R7705).

Front-panel controls and connectors for auxiliary test equipment are initial-letter capitalized.

Readjustment Interval

The length of time between readjustment depends on the amount of use the instrument receives, nature of environment, and the change in performance when components are replaced.

In general, partial readjustment is required if the components replace affect the calibration of the instrument. Complete readjustment is recommended if the instrument is not operating at its full capability. To ensure correct and accurate instrument operation, the instrument performance should be checked at regular intervals; for example, after 1000 hours of operation if used continuously, or every six months if used only occasionally.

General Instructions

When applying the generator signal to a loop-through connector on the monitor, the unused connector of the pair should be terminated into 75 ohms, except when performing Steps 29, 30, and 31 of the NTSC Procedure.

For easy access to all the internal adjustments and test points, remove the top and bottom covers from the instrument. Also, remove the left- and right-frame sections.

Use the generator Comp Sync output to externally trigger the test oscilloscope time base when viewing waveforms during the procedure. External triggering is especially important when checking amplitude or timing of chrominance signals.

In the complete procedures, steps that relate to Performance Check only are identified by the word "Check" in the step heading. Those steps that pertain to both the Performance Check and Adjustment Procedures are headed "Check/Adjust". If only a Performance Check is to be performed, follow the steps titled "Check" plus the parts of the combined "Check/Adjust" steps through all "CHECK" portions. If a complete Adjustment Procedure is to be performed, complete all parts of all steps, including the "Check" steps. This will assure that the instrument meets all Performance Requirements in the Specification section of this manual.

This procedure describes equipment setup, gives test point and adjustment locations, and describes results to be obtained when making each adjustment.

Wherever practical, each step will include complete instructions for performing the step. This is intended to permit starting at any step in the procedure, when perhaps only one adjustment may be needed. However, some adjustments require that other adjustments or checks be made before a satisfactory result can be obtained. Notification of this condition is made at the beginning of these steps.

When a certain equipment setup is used for several succeeding steps, the first step in the series will describe the setup. Each setup after that requiring the same setup will refer back to the original step for setup conditions.

Test Equipment

The complete list of required equipment for performing both the Performance Check and the Adjustment Procedure precedes this procedure. Those items that are required only for either the Performance Check or the Adjustment Procedure are indicated as such in the Test Equipment Required portion.

Test Equipment Required

The test equipment listed here was used in preparing these procedures. The measurement capabilities described are the minimum required to perform the complete procedures. Each piece of test equipment is assumed to be operating within its stated specifications. If alternative equipment is used, it must meet or exceed these requirements.

Items 1 through 13 are needed to perform all the 'CHECK' steps in the Performance Check Procedure. To perform the 'Optional Checks', items 14 through 18 are also required.

For the Adjustment Procedure, all items except 14 through 18 are needed.

1. Dc Voltmeter. Accurate within 0.1% for dc volts from 0 V to + and −200 V. For example, TEKTRONIX DM 501 Digital Voltmeter (see item 18).

2. Test Oscilloscope. Bandwidth, dc to at least 10 MHz; minimum deflection factor, 1 mV/div (10 mV/div with 10X probe); two input channels with provisions for independent or differential operation; dual time base with a sweep range from 50 ns/div to 5 s/div and provisions for a delayed sweep. For example, a TEKTRONIX 7603 Oscilloscope with a 7B53A Dual Time Base and a 7A13 Differential Comparator plug-in units.

3. 10X Probe. For use with the test oscilloscope. Tektronix Part No. 010-6105-01 (P6105 Probe).

4. Video Signal Source. Capable of providing composite video signals, including standard NTSC color bars (1 V p-p, 100% saturated, 75% amplitude, 7.5% setup, selectable 75% and 100% white reference), staircase, crosshatch pattern, and flat field or window signal. For example, a TEKTRONIX 140 NTSC Test Signal generator.

5. Linearity Graticule. Tektronix Part No. 331-0305-01.

6. Reference Light-Source or Optical Comparator. A Grafikon, or other similar device, such as a Hellige IRT or Macbeth can be used.

7. Light Source for Linearity Graticule. 150-watt incandescent lamp for projecting the linearity graticule onto the screen.

8. Coaxial Cable. Impedance, 75 ohms; length, 42 inches; equipped with bnc connectors. At least three cables are needed. Tektronix Part No. 012-0074-00.

9. End-Line Termination. Impedance, 75 ohms. Equipped with bnc connectors. Two terminations are needed. Tektronix Part No. 011-0102-00.

10. Feed-Through Termination. Impedance, 75 ohms. Equipped with bnc connectors. One needed. Tektronix Part No. 011-0103-02.

11. Dual-Input Coupler. Equipped with bnc connectors. Tektronix Part No. 067-0525-01.

12. Voltage Control Unit. Capable of varying ac line voltage output between 104 Vac and 126 Vac. For example, General Radio W10MT3W Metered Variac Autotransformer.

13. Resistor. 200 ohms; 1/8 W; 1%. Tektronix Part No. 321-0126-00. If desired, the resistor can be mounted on a connector by ordering the following parts:

One holder, terminal connector (black), Tektronix Part No. 352-0198-00. Two female pins, terminal connector, Tektronix Part No. 131-0621-00.

14. Connector, Bnc T. Tektronix Part No. 103-0030-00.

15. Variable Attenuator. 150 ohm variable resistor plus accessory housing. Fig. 6-1 shows Tektronix part numbers and how to construct this test fixture.

16. Return Loss Bridge. Tektronix Part No. 015-0149-00.

17. Signal Generator. Output amplitude continuously variable to 5 V p-p; sine wave leveled output, variable from 1 MHz to 5 MHz or greater, with a 50 kHz reference. For example, a TEKTRONIX SG 503 Leveled Sine Wave Generator (see item 18).

18. Power Module. For powering and housing TEKTRONIX DM 501 and SG 503 units. (Required if using these units.) TEKTRONIX TM 503.

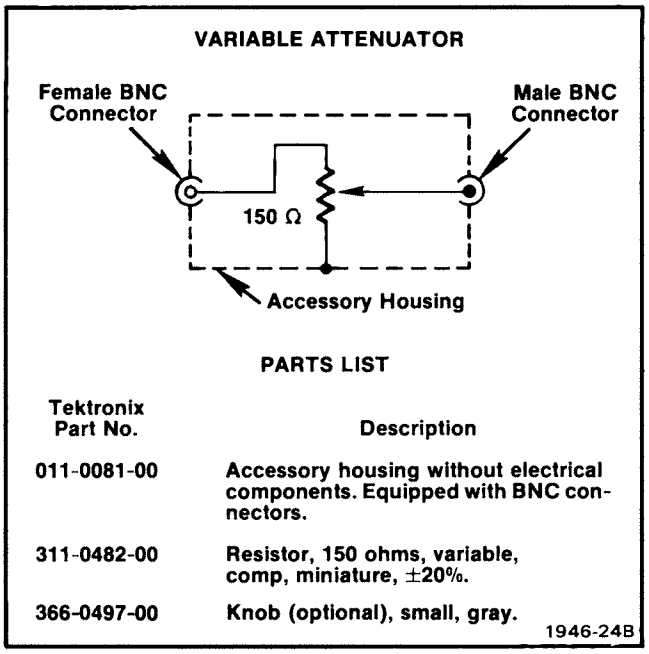


Fig. 6-1. Test fixture for varying the generator output signal amplitude.

NTSC PERFORMANCE CHECK/ADJUSTMENT PROCEDURE

NTSC CALIBRATION INDEX

Tables 6-1 and 6-2 serve as an index to the NTSC Performance Check/Adjustment procedure, and are intended to make any desired check or adjustment easy to locate within the procedure. These tables may also be used as an adjustment guide for the experienced service technician.

Table 6-1

ADJUSTMENTS, CHECKS, & SELECTED COMPONENTS FOR NTSC PICTURE MONITOR

Step No.	Adjustment Name	Circuit No.
	LV POWER SUPPLY	
1	−15 V Adjust	R8121
	VIDEO CHANNEL	
2	Ch A Input Comp	C1937
	Ch B Input Comp	C1909
3	Aperture Zero	R148
	Aperture Preset	R7710
4	Luminance Gain	R2977
5	Chroma Trap	L2581
6	Chroma Filter	L2655
7	R-Y Chroma Filter	L2529, L2535
	B-Y Chroma Filter	L2507, L2513
8	DC Offset	R1713
9	Contrast Preset	R7707
	Min Gain Adj	R1409
10	Brightness Preset	R7705
	Check Brightness Range	
11	Chroma Preset	R7803
	Hue Preset	R7903
	Error Amp Dc Balance	R2025
12	B-Y Phase	L2205
	B-Y Gain	R2917
13	G-Y Phase	R2407
	G-Y Gain	R2929
	DEFLECTION	
14	Deflection Yoke and Purity	Refer to Procedure
15	HORIZ CENTERING	R7301
	VERT CENTERING	R7305
	VERT SIZE	R7211
16	HORIZ SIZE	R7203
	Horiz Linearity	C5240, R1279
17	Vert Linearity	R5940
	Vert Linearity Balance	R5756
18	Side Tilt	R5595
	Side Pincushion	R5755

Table 6-1 (cont)

ADJUSTMENTS, CHECKS, & SELECTED COMPONENTS FOR NTSC PICTURE MONITOR (cont)

Step No.	Adjustment Name	Circuit No.
19	Pincushion Phase	T5830
	Pincushion Amplitude	R5540
	Pincushion Balance	R5535
20	Vert Expand Side Pincushion	R5775
	Vert Expand Side Tilt	R5776
	CONVERGENCE	
21	Horiz Convergence Skew	R5530
	Bowing	R5630
	HORIZ STATIC	R7303
	HORIZ TILT	R7401
	Side Convergence Parabola	R5318
	Convergence Magnets	See Procedure
	P5070	See Procedure
22	VERT STATIC	R7307
	VERT TILT	R7403
	Convergence Parabola	R5675
23	Deflection Yoke	See Procedure
24	Underscan Horiz Static Convergence	R5435
	SCREEN	
25	RED SCREEN BIAS	R7003
	GREEN SCREEN BIAS	R7103
	BLUE SCREEN BIAS	R7105
	Screen Volts	R6785
26	RED GAIN	R7001
	BLUE GAIN	R7201
	Red Gain Adj	R4419
	Blue Gain Adj	R4449
	Green Gain Adj	R4479

Table 6-2

OPTIONAL CHECKS FOR NTSC PICTURE MONITOR

Step No.	Check
27	Chrominance-to-Luminance Delay
28	Luminance Channel Amplitude Linearity
29	MODE Pushbuttons
30	Sync & Timing
31	Residual Subcarrier
32	Sync Stripper
33	High-Voltage Regulation
34	Return Loss

Preliminary

Connect the Voltage Control Unit to an ac power outlet. Connect the 670A ac power cord to the output of the Voltage Control Unit, and set the 670A POWER switch to ON. Set the Voltage Control Unit output to 115 Vac.

Check that the jumpers on the NTSC Decoder board and the Video Input & Sync board are set to their factory-set positions as shown in Figs. 4-3 and 4-4 of the Operating Changes portion of the Installation section of this manual.

Set the monitor slide switches to their 'up' positions. Set the right front-panel variable controls to PRESET and check that all pushbuttons are set to the 'out' position.

Allow the 670A and all test equipment 30 minutes warmup at 25° C, ±5° C, before starting the procedure.

LV POWER SUPPLY

1. Check/Adjust −15 V, +5 V, +15 V, and +120 V Supply Voltages and Regulation

a. Connect an accurate dc voltmeter between chassis ground and TP8051 (see Fig. 6-2).

b. CHECK—for a meter reading of −15 V within a tolerance of ±1% (−14.85 V to −15.15 V).

c. ADJUST—the −15 V Adjust (R8121) control (see Fig. 6-2) to obtain a meter reading of −15 V, ±0.5%.

d. CHECK—regulation of the −15 V supply. Should remain within 1% as the input voltage is varied between 104 Vac and 126 Vac (115 Vac, ±10%).

NOTE

The −15 V supply is the reference supply for the other supplies in the instrument. This voltage must be within tolerance for the other supplies to meet their specification of ±3%.

e. CHECK—accuracy and regulation of the +5 V, +15 V, and +120 V supplies, referring to Table 6-3 and Fig. 6-2 for test points and accuracy specification. Check regulation between 104 Vac and 126 Vac.

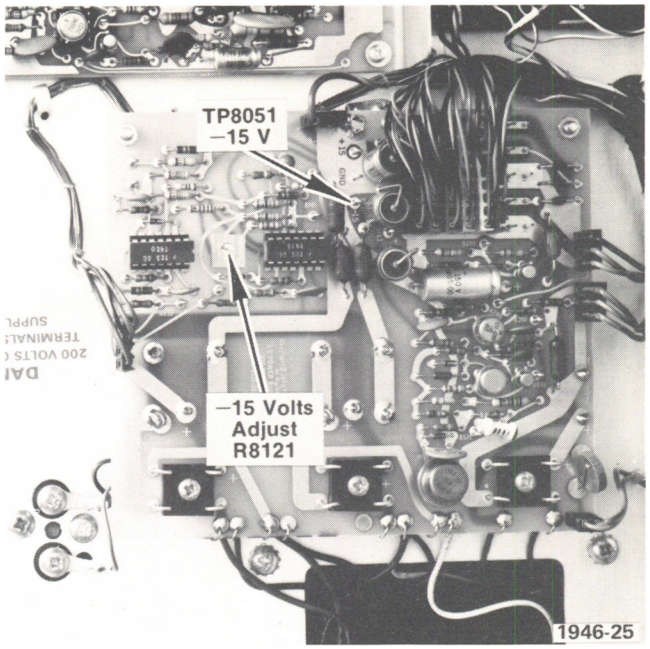


Fig. 6-2. Partial LV Power board, showing test point and adjustment locations.

Table 6-3

POWER SUPPLY TEST POINTS & ACCURACIES

Supply	Test Point	Limits
+5 V	TP8153	4.85 to 5.15 V
+15 V	TP8047	14.55 to 15.45 V
+120 V	TP8053	116.4 to 123.6 V

NOTE

The kinescope anode supply is 24 kV, ±1 kV. Tuning the High-Voltage Oscillator, which affects the anode supply voltage, is described in the Maintenance section of this manual.

@

WARNING

Measurement of the anode supply is difficult to achieve safely, and is not recommended.

f. Disconnect the voltmeter. Disconnect the monitor from the Voltage Control Unit, and connect the monitor ac power cord to a suitable ac power source.

VIDEO CHANNEL

2. Check/Adjust Channels A and B Input Compensation

a. Apply a convergence crosshatch pattern signal through a feed-through termination and a dual-input coupler to the monitor VIDEO INPUT A and B connectors. Check that the INPUT switch is set to A.

b. Using ac coupling, connect the test oscilloscope probe tip to TP1317 on the Video Input & Sync board (see Fig. 6-3). Externally trigger the test oscilloscope from the signal generator composite sync output.

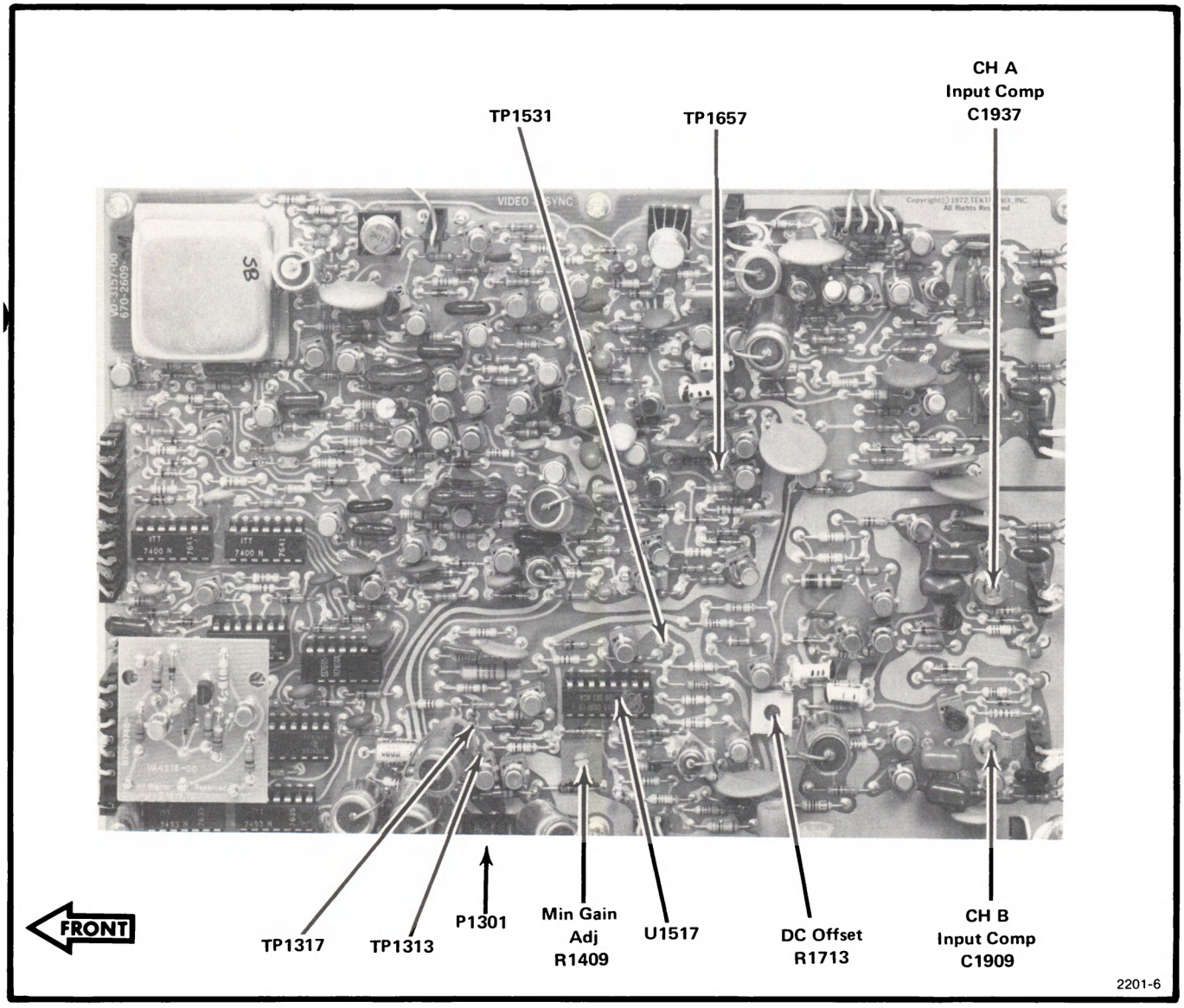


Fig. 6-3. Video Input & Sync board test point and adjustment locations.

c. CHECK—that the pulses (vertical crosshatch lines) are the same amplitude as the bar (horizontal crosshatch line) as shown in Fig. 6-4. Set the monitor INPUT switch to B, and check for the same results.

d. ADJUST—C1909 so that the pulses are the same amplitude as the bar. Set the INPUT switch to A, and adjust C1927 for the same results.

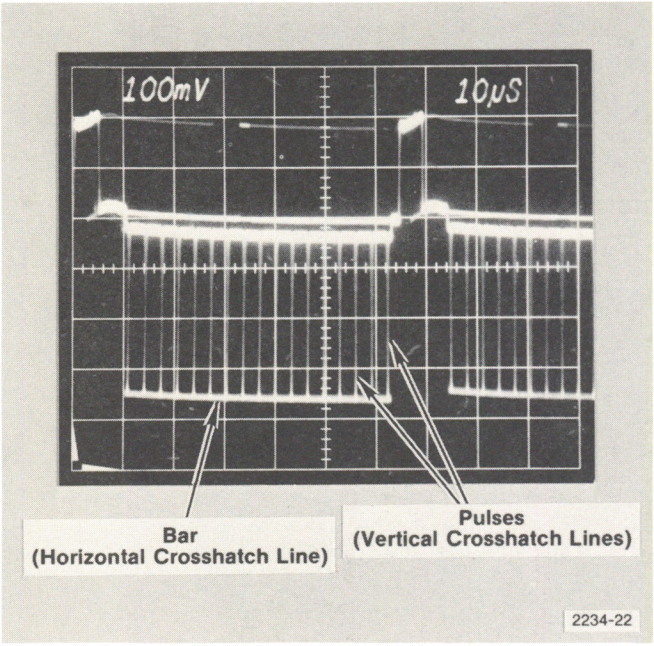


Fig. 6-4. Properly compensated crosshatch waveform at TP1317.

e. Remove the dual-input coupler and feed-through termination.

3. Check/Adjust Aperture Zero and Preset

a. Apply a convergence crosshatch pattern signal to the monitor VIDEO INPUT A connector. Connect a 75 Ω end-line termination to the other VIDEO INPUT A loop-through connector. Set the monitor INPUT switch to A.

b. Using dc coupling, connect the test oscilloscope probe tip to TP2865 on the NTSC Decoder board (see Fig. 6-5).

c. Check that bandpass jumper P2577 on the board is set to the Narrow position; pins 1 and 2 are jumpered.

d. Set the right front-panel APERTURE control just out of the PRESET detent position (minimum aperture correction).

e. CHECK—that the pulses (vertical crosshatch lines) are the same amplitude as the bar (horizontal crosshatch line) as observed on the test oscilloscope (see Fig. 6-6A).

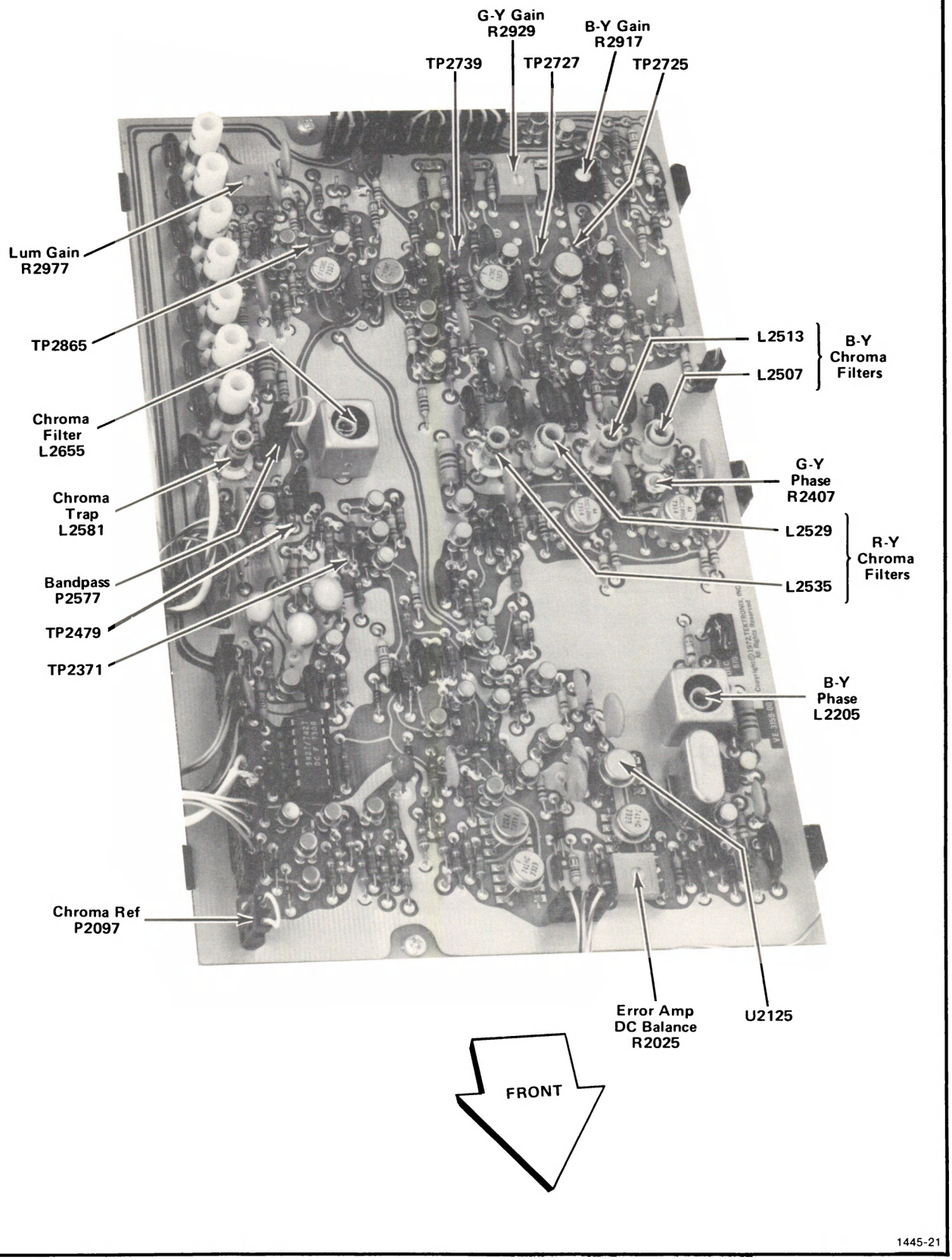


Fig. 6-5. NTSC Decoder board test point and adjustment locations.

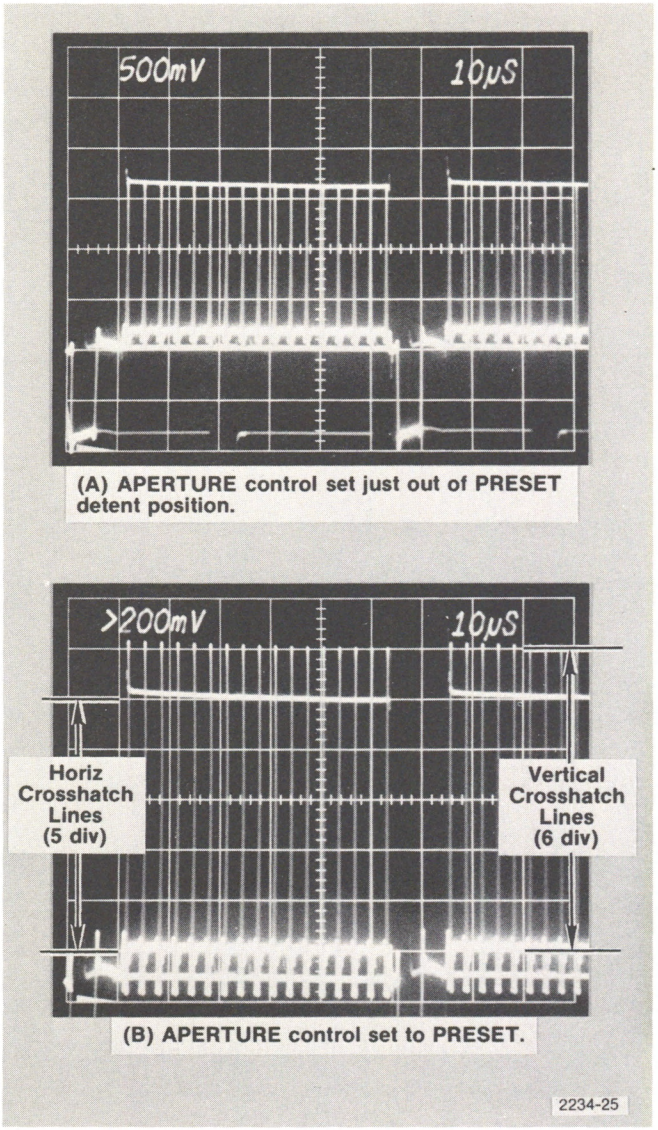


Fig. 6-6. Crosshatch waveforms at TP2865.

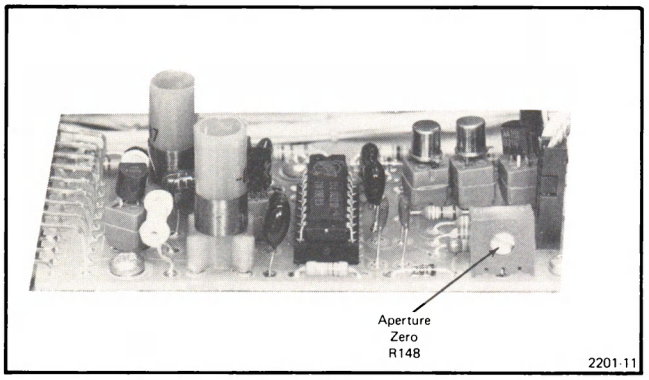


Fig. 6-7. Variable Aperture Corrector board.

f. ADJUST—the Aperture Zero (R148) adjustment (see Fig. 6-7) so that the pulses are the same amplitude as the bar.

g. Set the front-panel APERTURE control to the PRESET position.

h. CHECK—that the pulses (vertical crosshatch lines) are 20% greater in amplitude than the bar (horizontal crosshatch line) as observed on the test oscilloscope (see Fig. 6-6B). NOTE: The user may prefer to have Aperture Preset adjusted to some other level than described here.

i. ADJUST—the Aperture Preset (R7710) adjustment (see Fig. 6-8) so that the pulses are 20% greater in amplitude than the bar (or other amplitude, as preferred by the user).

j. Disconnect the crosshatch pattern signal from the monitor.

4. Check/Adjust Luminace Gain

a. Apply a standard color bar signal with 100% white reference and 7.5% setup to the monitor VIDEO INPUT A connector. Terminate the other loop-through VIDEO INPUT A in 75 Ω.

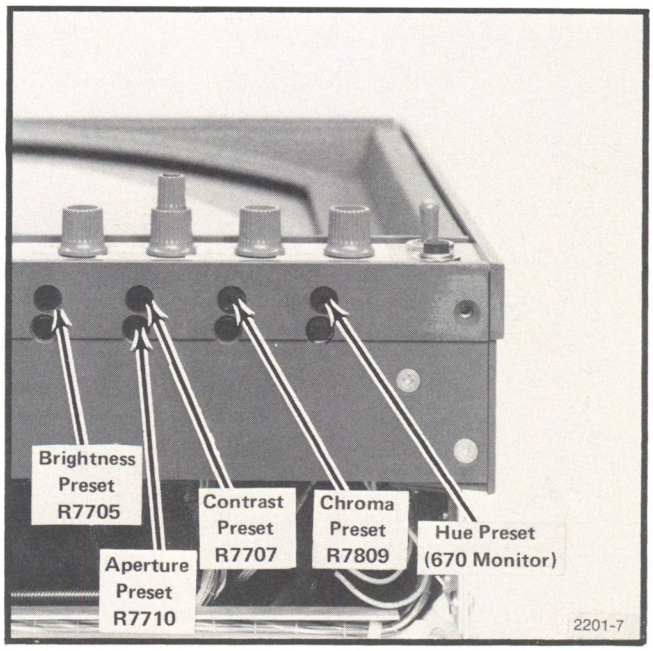


Fig. 6-8. Location of Preset adjustments.

b. Using dc coupling, connect the test oscilloscope probe tip to TP2865 on the NTSC Decoder board (see Fig. 6-5).

c. CHECK—that the waveform amplitude is 2 V from 7.5% setup to the 100% white level (see Fig. 6-9).

d. ADJUST—the Lum Gain (R2977) adjustment (see Fig. 6-5) so that the waveform amplitude is 2 V from 7.5% setup to the 100% white level.

NOTE

If the color bar signal in use has a 75% white reference, the waveform amplitude should be set for 1.5 V from 7.5% setup to the 75% white level.

5. Check/Adjust Chroma Trap

a. Use the same setup as described in parts a and b of Step 4.

b. CHECK—for minimum chrominance amplitude on the luminance steps; typically 50 mV or less.

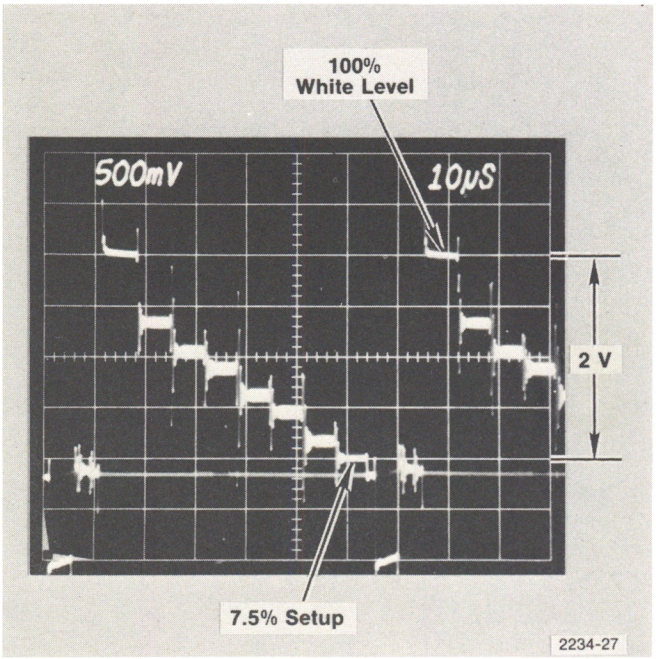


Fig. 6-9. Color bar luminance waveform at TP2865.

c. ADJUST—the Chroma Trap (L2581) adjustment (see Fig. 6-5) for minimum chrominance amplitude on the luminance steps.

6. Check/Adjust Chroma Filter

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to TP2479 on the NTSC Decoder board (see Fig. 6-5).

c. CHECK—for minimum chrominance amplitude on the luminance steps; typically 30 mV or less.

d. ADJUST—the Chroma Filter (L2655) adjustment for minimum chrominance amplitude on the luminance steps.

NOTE

If the chroma filters in Steps 6 and 7 are adjusted, check chrominance-to-luminance delay as described in Step 27 of the NTSC procedure.

7. Check/Adjust R-Y and B-Y Chroma Filters

a. Use the same setup as described in part a of Step 4.

b. Turn the monitor off and remove U2125 (see Fig. 6-5). Turn the monitor on and set the MODE switch to COLOR.

NOTE

If your generator has a Burst Synchronization switch, turn this switch off instead of removing U2125.

c. Using ac coupling, connect the test oscilloscope probe tip to TP2739 on the NTSC Decoder board (see Fig. 6-5). Check that the oscilloscope is externally triggered from the generator Composite Sync signal. Locate the green-magenta transition as shown in Fig. 6-10A. (Sweep rate of the test oscilloscope should be 10 μs/div). Position the green-magenta transition on the graticule centerline, then turn on the oscilloscope X10 magnifier. The display should be similar to Fig. 6-10B.

d. CHECK—for good transient response at the green-magenta transition. The transient response should be free of noticeable overshoot or rounding, similar to Fig. 6-10B.

e. ADJUST—L2535 and L2529 for best transient response at the green-magenta transition.

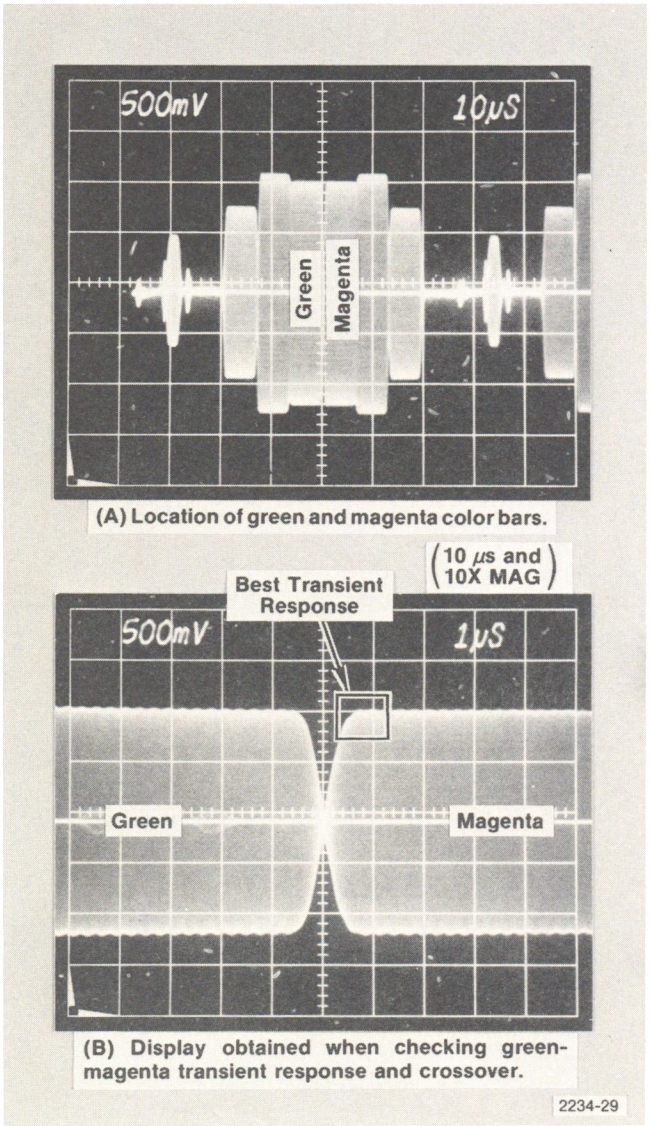


Fig. 6-10. Typical waveforms at TP2739 (or TP3720 for PAL) observed when performing step 7. The test oscilloscope is externally triggered from the generator Comp Sync output.

f. Move the probe tip to TP2725.

g. CHECK—for good transient response at the green-magenta transition. (use the same display technique as in part c.)

h. Turn the monitor power off, re-install U2125, and then turn on the monitor. (Or, turn the generator Burst Synchronization switch on.) Set the monitor MODE switch to AUTO.

8. Check/Adjust Dc Offset

a. Use the same setup as described in part a of Step 4.

b. Using dc coupling, connect the test oscilloscope probe tip to TP1531 on the Video Input & Sync board (see Fig. 6-3).

c. CHECK—that the 7.5% setup (black level) of the waveform is equal to 0 V (see Fig. 6-11).

d. ADJUST—the Dc Offset (R1713) adjustment so that the 7.5% setup level of the waveform is equal to 0 V.

9. Check/Adjust Contrast Preset and Min Gain Adj

a. Use the same setup as described in part a of Step 4.

b. Disconnect P1301 (see Fig. 6-3), and connect a 200 Ω, 1%, resistor from pin 1 to pin 2 on the board at P1301.

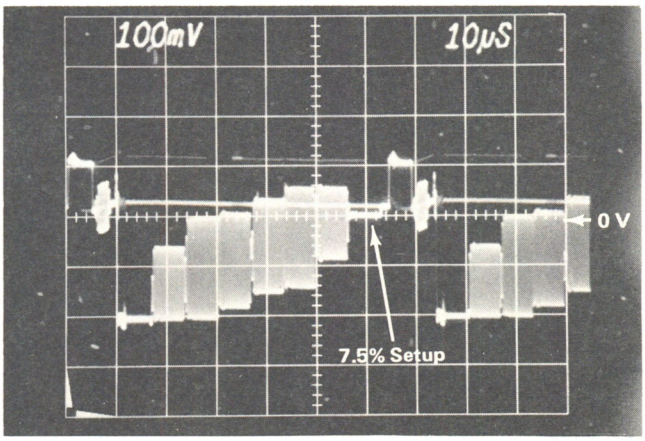


Fig. 6-11. Color bar waveform at TP1531.

c. Using ac coupling, connect the test oscilloscope probe tip to TP1313 (see Fig. 6-3).

d. CHECK—that the amplitude of the signal, from blanking to the 100 IRE white reference, is 200 mV (see Fig. 6-12).

e. ADJUST—the Contrast Preset (R7707) control so that the amplitude of the signal, from blanking to the 100 IRE white reference, is 200 mV.

f. Set the front-panel CONTRAST control to its minimum amplitude position.

g. CHECK—that the waveform, displayed by the test oscilloscope, is 40 mV from blanking to 100 IRE white reference. (0.2X the PRESET amplitude of 200 mV).

h. ADJUST—the Min Gain Adj (R1409) control on the Video Input & Sync board (see Fig. 6-3) so that the waveform is 40 mV from blanking to 100 IRE white reference.

i. Rotate the CONTRAST control fully clockwise.

j. CHECK—that the waveform amplitude is at least 2X (400 mV) the PRESET amplitude.

NOTE

If U1517 has been replaced, and a CONTRAST control range of 0.2X to 2X cannot be obtained when performing parts h and j of this step, select the values of R1405 and/or R1503 (see Fig. 6-3).

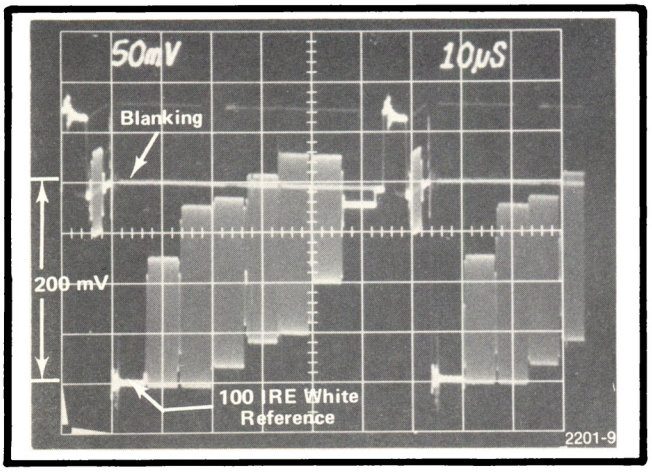


Fig. 6-12. Color bar waveform at TP1313.

k. Disconnect the 200 Ω resistor and reconnect P1301 to the board pin connections. Set the CONTRAST control to PRESET.

10. Check/Adjust Brightness Range and Preset

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to the red output TP6215 on the Kinescope Socket board (see Fig. 6-13).

c. Press in the NTSC TEST pushbutton.

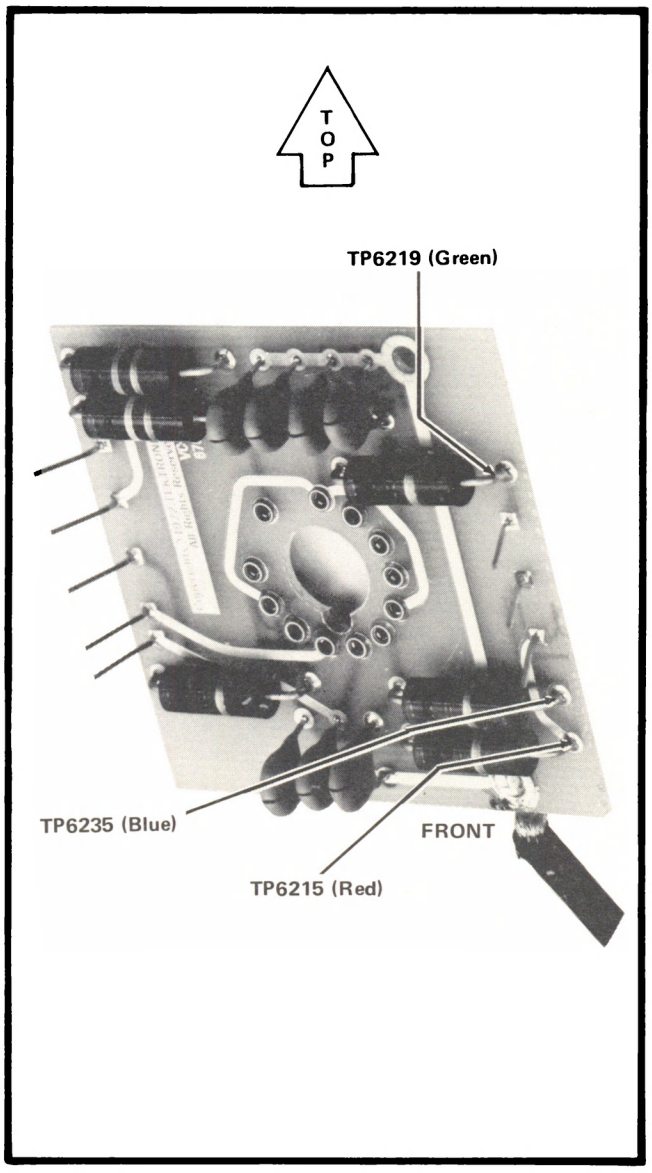


Fig. 6-13. Kinescope Socket board.

d. CHECK—that the black reference level is equal to the video signal blanking level (see Fig. 6-14).

e. ADJUST—the Brightness Preset (R7705) control (see Fig. 6-8) so that the black reference level is equal to the video signal blanking level.

f. CHECK—that the BRIGHTNESS control has an approximate dc range of at least ±25% of the waveform amplitude. Set the BRIGHTNESS control to PRESET.

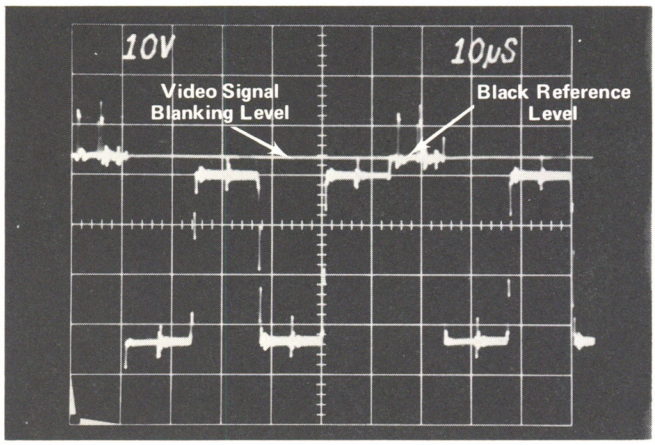


Fig. 6-14. Waveform obtained at the red output test point (TP6215).

11. Check/Adjust Chroma Preset, Hue Preset, and Error Amp Dc Balance

a. Use the same setup as described in part a of Step 4. Check that the NTSC TEST pushbutton is pressed in.

b. Using dc coupling, connect the test oscilloscope probe tip to TP2739 on the NTSC Decoder board (see Fig. 6-5).

c. Note the location of burst as shown in Fig. 6-15A. The exact location of burst can be determined by rotating the front-panel HUE control. Return the HUE control to PRESET after locating burst.

d. Turn the front-panel CHROMA control fully clockwise and magnify the oscilloscope display as shown in Fig. 6-15B.

e. CHECK—that the burst portion of the waveform coincides with the video signal blanking level. Fig. 6-15B shows the proper waveform.

f. ADJUST—Hue Preset R7903 (see Fig. 6-8) so that the burst portion of the waveform coincides with the video signal blanking level.

g. Turn the front-panel CHROMA control to the minimum position; that is, just out of the detent PRESET position. Set the test oscilloscope vertical deflection factor to 50 mV/div as shown in Fig. 6-15C.

h. Check—that the burst portion of the waveform coincides with the video signal blanking level as shown in Fig. 6-15C.

i. ADJUST—Error Amp Dc Balance R2025 (see Fig. 6-5) so that the burst portion of the waveform coincides with the video signal blanking level.

j. INTERACTION—Repeat parts f through j of this step to minimize any interaction.

NOTE

Another method for adjusting R7903 and R2025 accurately is to turn off the generator R-Y switch and adjust for a nulled demodulator color bar output waveform as shown in Fig. 6-15D. Adjust R7903 when the CHROMA control is fully clockwise, and adjust R2025 when the CHROMA control is set to minimum. Repeat this procedure until interaction is minimized.

k. Set the CHROMA control to PRESET.

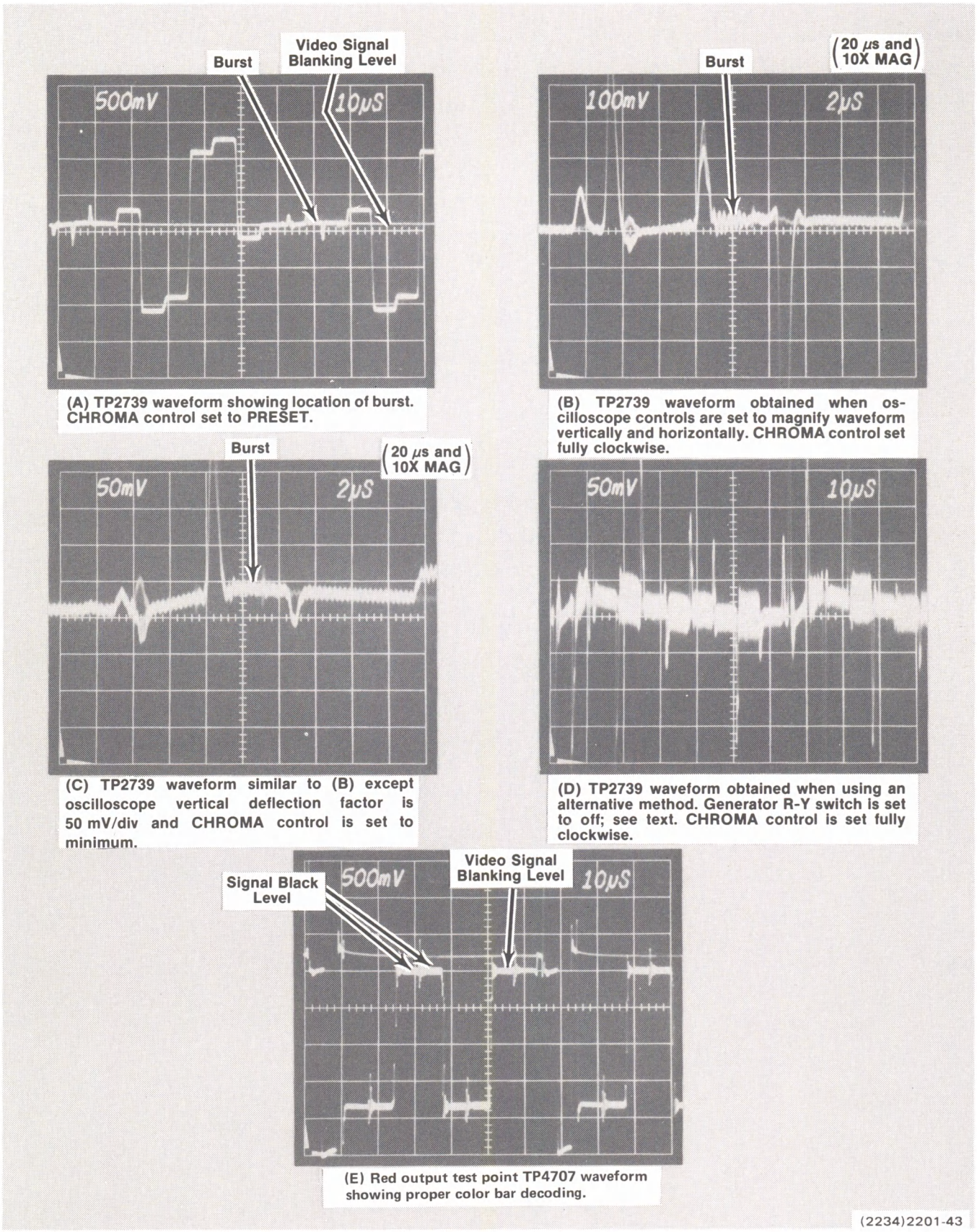

Burst
Video Signal Blanking Level
500mV
10μS
(A) TP2739 waveform showing location of burst. CHROMA control set to PRESET.
Burst
(20 μs and 10X MAG)
100mV
2μS
(B) TP2739 waveform obtained when oscilloscope controls are set to magnify waveform vertically and horizontally. CHROMA control set fully clockwise.
Burst
(20 μs and 10X MAG)
50mV
2μS
(C) TP2739 waveform similar to (B) except oscilloscope vertical deflection factor is 50 mV/div and CHROMA control is set to minimum.
50mV
10μS
(D) TP2739 waveform obtained when using an alternative method. Generator R-Y switch is set to off; see text. CHROMA control is set fully clockwise.
Signal Black Level
Video Signal Blanking Level
500mV
10μS
(E) Red output test point TP4707 waveform showing proper color bar decoding.
(2234)2201-43

Fig. 6-15. Typical waveforms obtained at TP2739 and TP4707 when performing step 11.

l. Using ac coupling, connect the test oscilloscope probe tip to TP4707 on the Output Amplifier board (see Fig. 6-16), and set the generator standard color bar signal for 75% white reference.

m. CHECK—for proper color bar decoding as shown in Fig. 6-15E. The color bar signal black level should be parallel to the video signal blanking level (should be on the same horizontal graticule line).

n. ADJUST—Chroma Preset R7803 (see Fig. 6-8) so that the color bar signal black level is parallel to the video signal blanking level as shown in Fig. 6-15E.

12. Check/Adjust B-Y Phase and Gain

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to the blue output TP6235 (see Fig. 6-13) on the Kinescope Socket board.

c. CHECK—that the signal black level of the color bars is parallel to the video signal blanking level, similar to the waveform shown in Fig. 6-17.

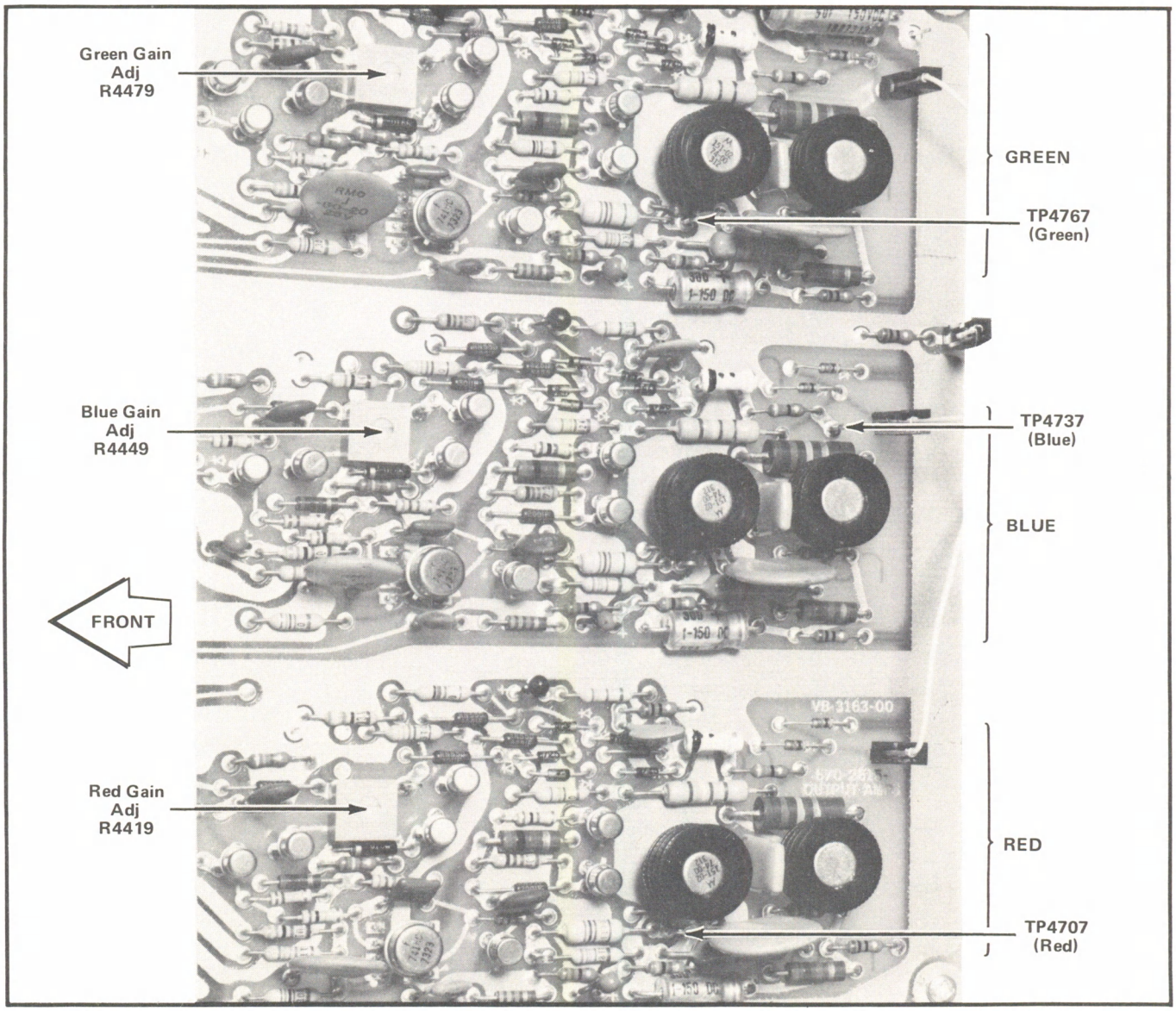


Fig. 6-16. Output Amplifier board.

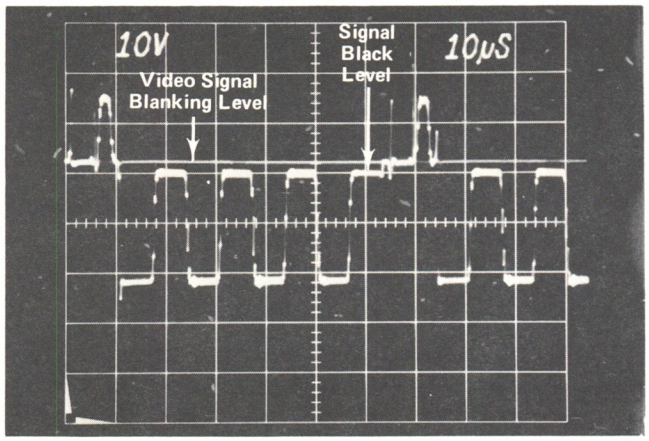


Fig. 6-17. Waveform obtained at the blue output test point (TP6235) when performing step 12. Proper color bar decoding is illustrated.

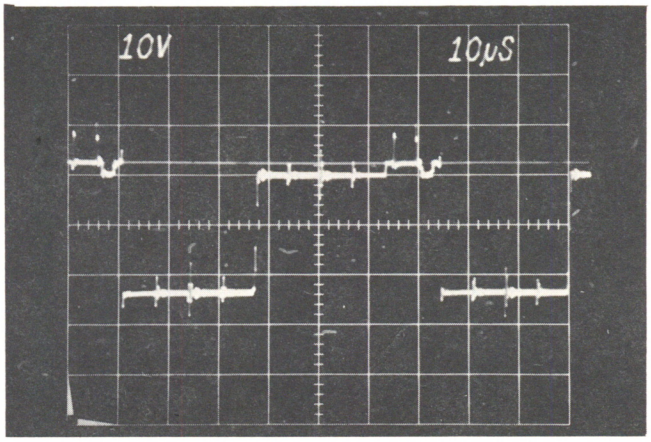


Fig. 6-18. Waveform obtained at the green output test point (TP6219) when performing step 13. Proper color bar decoding is illustrated.

d. ADJUST—B-Y Phase L2205 and B-Y Gain R2917 (see Fig. 6-5) for proper color bar decoding, similar to the waveform shown in Fig. 6-17.

13. Check/Adjust G-Y Phase and Gain

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to green output TP6219 on the Kinescope Socket board (see Fig. 6-13).

c. CHECK—that the signal black level of the color bars is parallel to the video signal blanking level, similar to the waveform shown in Fig. 6-18.

d. ADJUST—G-Y Phase R2407 and G-Y Gain R2929 (see Fig. 6-5) for proper color bar decoding, similar to the waveform shown in Fig. 6-18.

e. Disconnect the test oscilloscope probe from the monitor.

DEFLECTION

14. Check/Adjust Deflection Yoke and Purity

a. Connect the convergence crosshatch pattern signal from the generator to the monitor VIDEO INPUT A connector. Terminate the other VIDEO INPUT A loop-through connector in 75 Ω.

b. Check that the MODE switch is set to AUTO, and that all front-panel SCREEN switches are set to ON.

c. Depress the DEGAUSS pushbutton for at least 10 seconds.

WARNING

Electrical shock hazards exist in some areas of the instrument due to high voltage. An illustration located on a chassis stiffener near the top front frame of the instrument shows the location of these areas.

d. CHECK—Since misconvergence can affect purity, precheck static convergence by performing Steps 21 and 22 of this procedure. If the display needs to be converged, preadjust the front-panel VERTICAL and HORIZONTAL STATIC controls. Also, adjust the gray static convergence magnets (see Fig. 6-19); leave the white convergence magnets in their centered position. The remaining adjustments in Steps 21 and 22 need not be adjusted at this time.

e. Display a 100 IRE flat field signal on the monitor. Set the GREEN and BLUE SCREEN switches to OFF. Depress the DEGAUSS pushbutton for at least 10 seconds.

f. CHECK—that the monitor display is uniformly red.

g. ADJUST—the Purity adjustments (see Fig. 6-19) to obtain a uniformly red display. If further improvement is necessary, loosen the yoke clamp. Slide the yoke forward or back to obtain the best red screen display. Display a convergence crosshatch pattern signal. Rotate the yoke so that the center vertical line is vertical. Retighten the yoke clamp. Display a 100 IRE flat field signal on the monitor. If necessary, readjust the Purity adjustments. If there is still some impurity, use a hand-held degaussing coil to completely degauss the monitor.

h. Set the GREEN SCREEN switch to ON, and the RED SCREEN switch to OFF.

i. CHECK—that the monitor display is uniformly green.

j. Set the BLUE SCREEN switch to ON, and the GREEN SCREEN switch to OFF.

k. CHECK—that the monitor display is uniformly blue.

l. READJUST—Purity adjustments for best compromise setting of red, green, and blue purity.

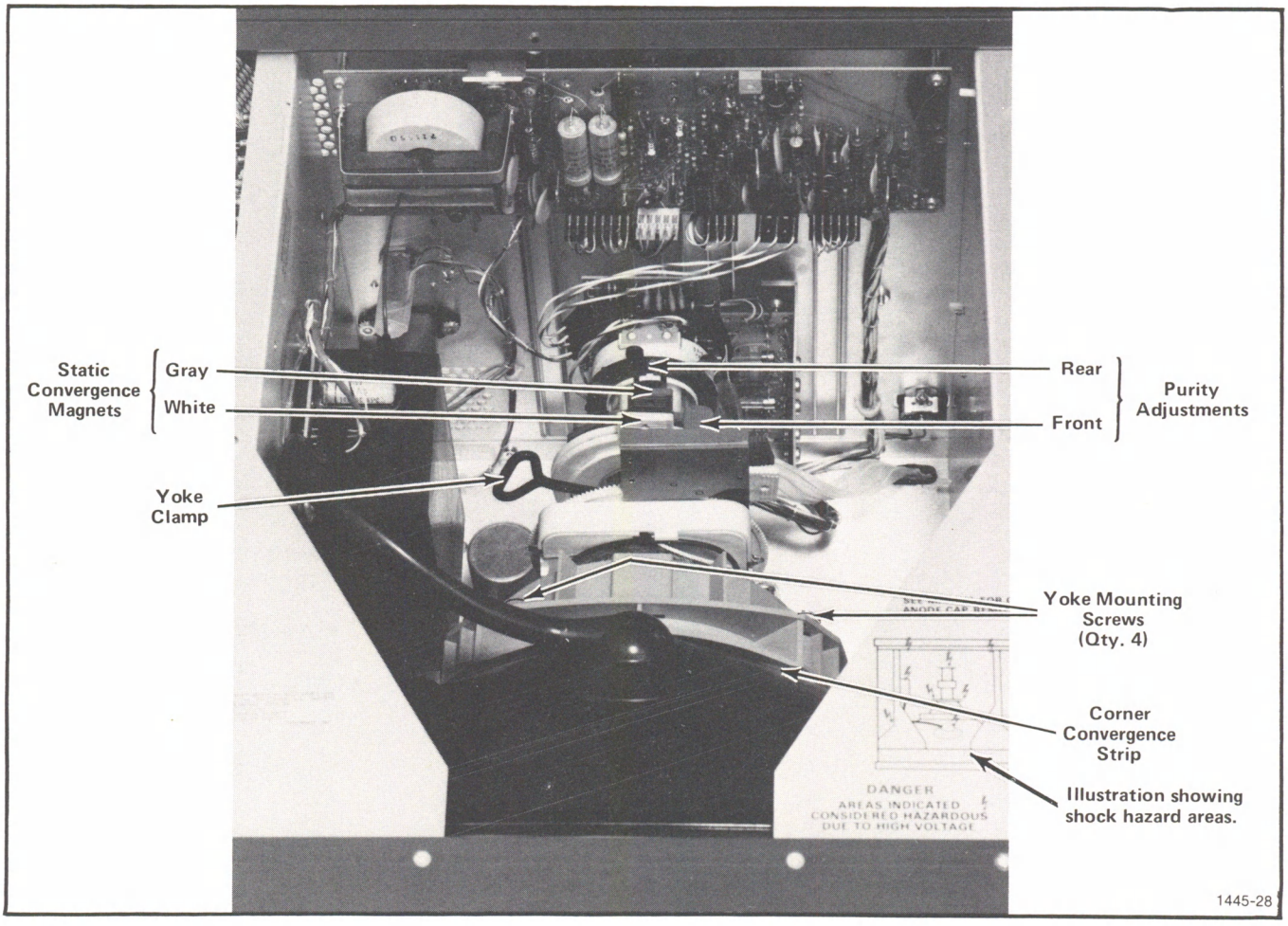


Fig. 6-19. Location of kinescope neck components.

15. Check/Adjust Vertical and Horizontal Centering and Vertical Size

a. Display a convergence crosshatch pattern signal on the monitor.

b. Set the GREEN SCREEN switch to ON. Set the BLUE and RED SCREEN switches to OFF.

c. Push in the SCAN Size pushbutton to the Underscan position.

d. Set the test signal generator Convergence Vert and Horiz Position controls so that the crosshatch pattern is properly centered on the screen. The vertical lines at the left and right edges of the display should be positioned equal distance from the edges of video blanking (not the bezel or screen edges). The horizontal lines at the top and bottom sides of the display should be positioned equal distance from the edges of video blanking.

e. Set the SCAN Size pushbutton to Full (out position).

f. Place a linearity graticule directly over the viewing screen of the monitor. After properly centering the graticule within the viewing area of the screen, tape the graticule in a few places to hold it in position.

g. Place a 150-watt incandescent light source 24 inches away from the screen of the monitor and aimed at the center of the screen. The light source, at this distance, projects a proper size linearity graticule on the screen of the monitor.

h. CHECK—that the crosshatch pattern is vertically and horizontally centered.

i. ADJUST—the monitor left front-panel VERTICAL CENTER (R7305) and HORIZONTAL CENTER (R7301) adjustments to center the crosshatch pattern display.

j. CHECK—that the vertical size is such that the horizontal lines are centered within their associated small circles projected by the linearity graticule.

k. ADJUST—the monitor VERTICAL SIZE (R7211) adjustment so that the horizontal lines are centered within their associated small circles projected by the linearity graticule.

If necessary, readjust the deflection yoke so that the vertical centerline of the display is vertical. Use the small circles in the vertical row at the center of the screen for checking display centering and vertical alignment. Vertical linearity tolerance is ±1% of picture height within the central area bounded by the circle whose diameter equals the picture height; tolerance is ±2% of picture height outside of this central area. Fig. 2-4 in the Operating Instructions section of this manual illustrates the linearity graticule.

16. Check/Adjust Horizontal Size and Linearity

a. Use the same setup as described in parts a, b, d, e, f, and g in Step 15.

b. CHECK—that the vertical lines are centered within their associated small circles projected by the linearity graticule. Use the two horizontal rows of small circles across the middle of the screen for this check. Linearity tolerance is ±1% within the central area bounded by the circle whose diameter equals the picture height; tolerance is ±2% outside of this central area.

c. ADJUST—the monitor HORIZONTAL SIZE (R7203) adjustment so that the vertical lines are centered within their associated small circles projected by the linearity graticule.

d. CHECK—horizontal linearity to the same specification described in part b of this step. If horizontal linearity is not within specification, select the value of the Horiz 'S' linearity capacitor, C5240 (see Fig. 6-20 and Table 6-4). To increase the value of C5240, connect another capacitor in parallel. To decrease the value of C5240, substitute with a capacitor of smaller value.

NOTE

If the displayed crosshatch pattern moves off center while performing parts c and d, readjust the HORIZONTAL CENTER control to maintain a centered display. C5240 affects the position of the vertical lines between the edge and center of the display symmetrical with the other side of the display. R1279 affects the position of the center of the display with respect to the sides.

Table 6-4

SELECTABLE COMPONENTS FOR HORIZONTAL LINEARITY

Component	Description	Tektronix Part No.
C5240	0.1 μF, 20%, 400 V	285-0526-00
	0.15 μF, −2%, +20%, 400 V	285-0532-00
	0.27 μF, 20%, 600 V	285-0700-00
	0.5 μF, 20%, 400 V	285-0537-00

e. RECHECK—horizontal linearity as described in part b of this step. If horizontal linearity needs further improvement, change the value of R1279 on the Video Input & Sync board (see Fig. 6-3).

After changing R1279 to another value, apply a color bar signal to the monitor and check that the duration of the negative-going blanking signal at the junction of R6717 and P6703-3 (see Fig. 6-21A) falls within the duration of the video blanking signal as observed at the green output TP6219. If not, select a compromise value. Fig. 6-21B shows a time-related dual-trace oscilloscope display of the two waveforms.

f. Reapply the convergence crosshatch pattern to the monitor.

17. Check/Adjust Vertical Linearity and Vert Linearity Balance

a. Use the same setup as described in parts a, b, d, e, f, and g in Step 15.

b. CHECK—that the horizontal lines of the crosshatch pattern are centered within their associated small circles projected by the linearity graticule.

Vertical linearity tolerance is ±1% within the central area bounded by the circle whose diameter equals the picture height; tolerance is ±2% outside of this central area.

c. ADJUST—the Vert Linearity Balance (R5756) and Vertical Linearity (R5940) adjustments (see Fig. 6-20) so that the horizontal lines of the crosshatch pattern are centered within their associated small circles.

d. ADJUST—if necessary, the VERTICAL SIZE (R7211) and CENTER (R7305) adjustments to maintain a centered pattern while performing part c of this step.

e. ADJUST—the focus (R6953) adjustment to obtain well-defined horizontal lines of the crosshatch pattern.

18. Check/Adjust Side Tilt and Side Pincushion

a. Use the same setup as described in parts a, b, d, e, f, and g in Step 15.

b. CHECK—that the left and right vertical lines of the crosshatch pattern are vertical and free of objectionable bowing.

c. ADJUST—the Side Tilt (R5595) adjustment (see Fig. 6-20) to minimize tilt of the left and right vertical lines of the crosshatch pattern.

d. ADJUST—the Side Pin (R5755) adjustment to minimize bowing of the left and right vertical lines of the crosshatch pattern.

19. Check/Adjust Pincushion Phase, Amplitude, and Balance

a. Use the same setup as described in parts a, b, d, e, f, and g in Step 16.

b. CHECK—that the horizontal lines at the top and bottom areas of the monitor display are within the specification given in Step 17, part b.

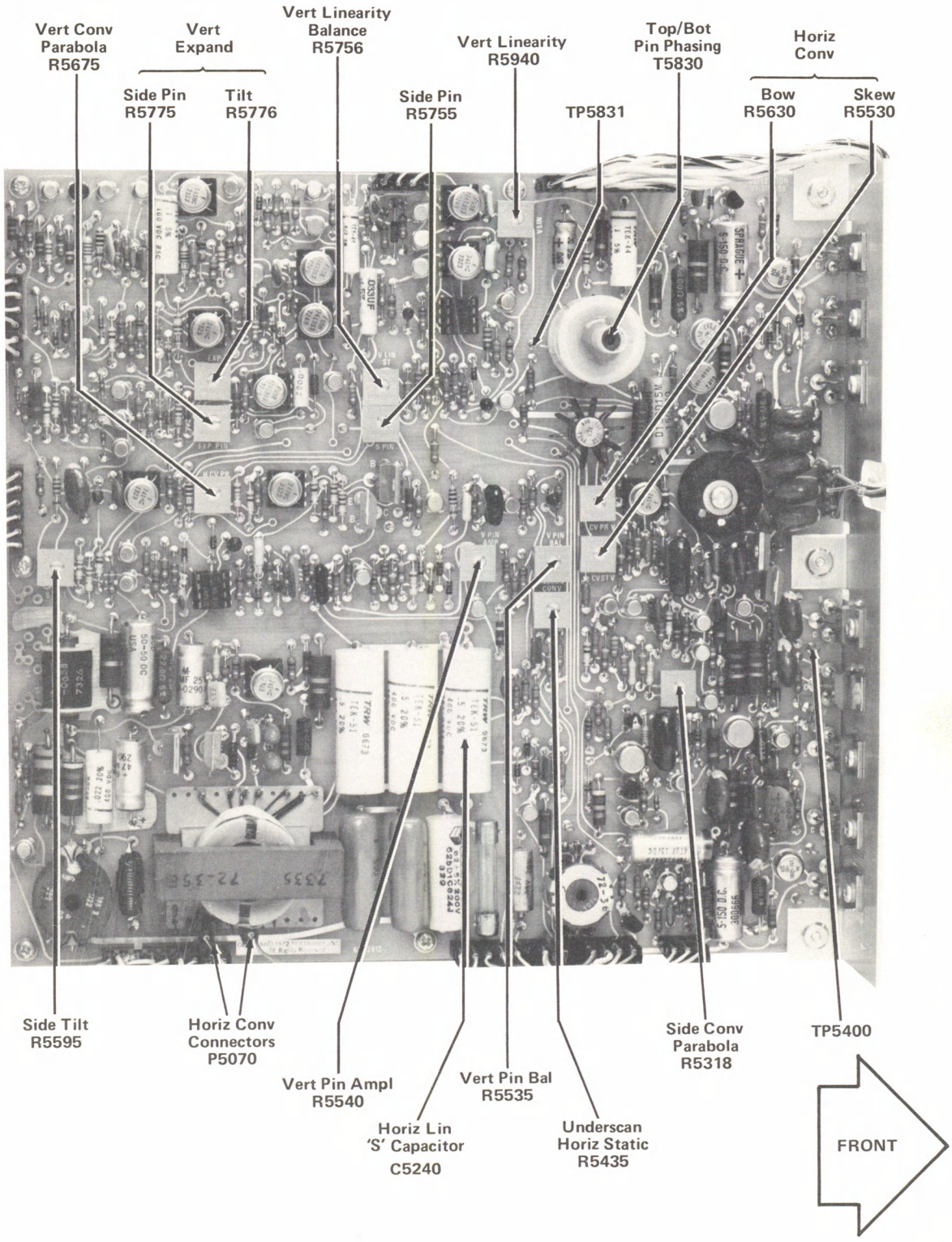
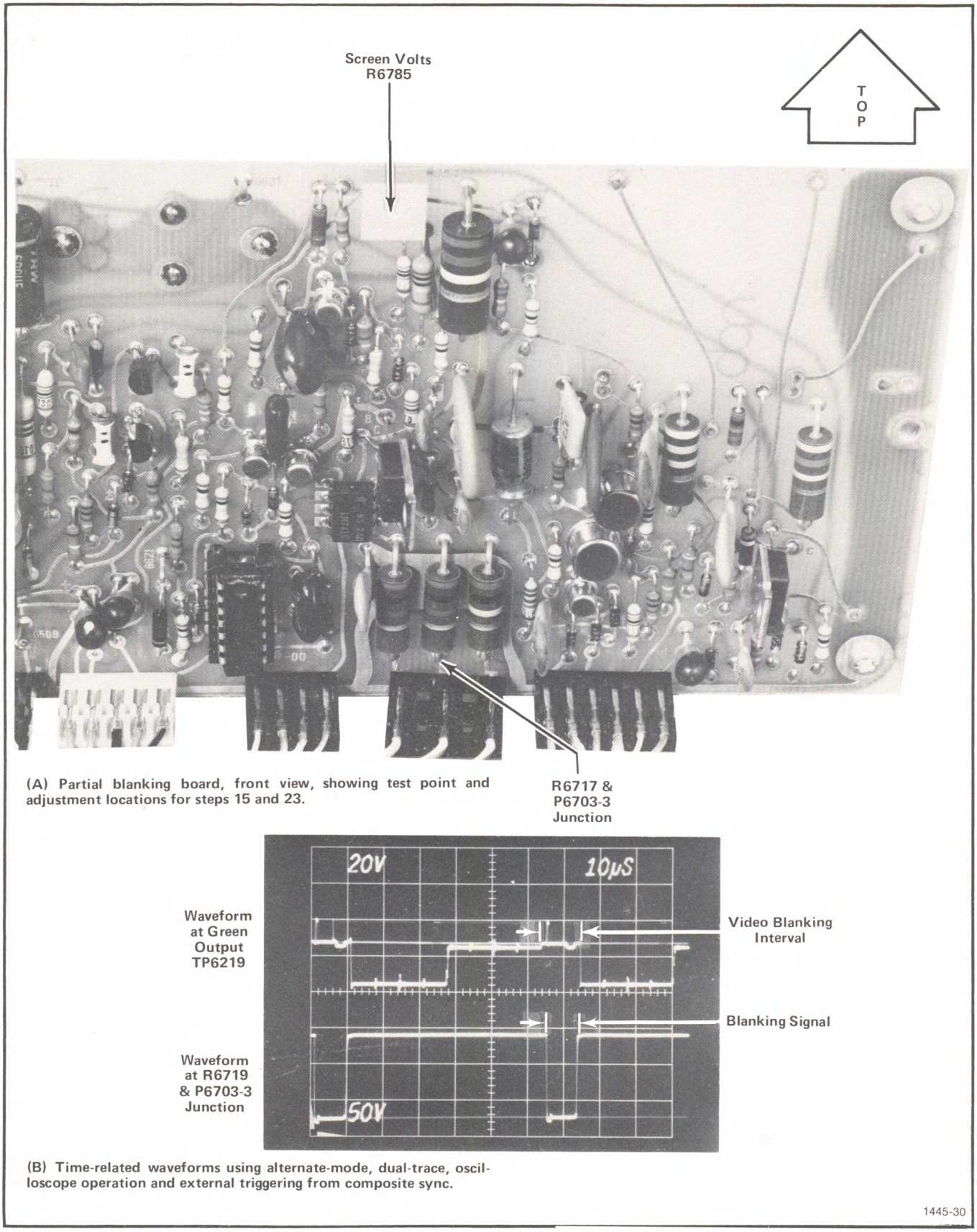


Fig. 6-20. Deflection board.



(A) Partial blanking board, front view, showing test point and adjustment locations for steps 15 and 23.

(B) Time-related waveforms using alternate-mode, dual-trace, oscilloscope operation and external triggering from composite sync.

Fig. 6-21. Checking timing of the blanking signal.

c. Using dc coupling, connect the test oscilloscope probe tip to TP5831 (see Fig. 6-20). Externally trigger the test oscilloscope time base from the generator vertical (field) drive signal.

The dc level at the center of the waveform should be +120 V within 5%. Set the test oscilloscope vertical input coupling to ac. Fig. 6-22 shows the normal waveform characteristics. Use this waveform as a guide when performing the adjustments in this step.

d. ADJUST—the Pincushion Phase (T5830) adjustment (see Fig. 6-20) so that any bowing of the top line is moved to the center of the line.

e. ADJUST—the Vert Pin Ampl (R5540) adjustment and the Vert Pin Bal (R5535) adjustment to minimize bowing of the horizontal lines at the top and bottom areas of the monitor display.

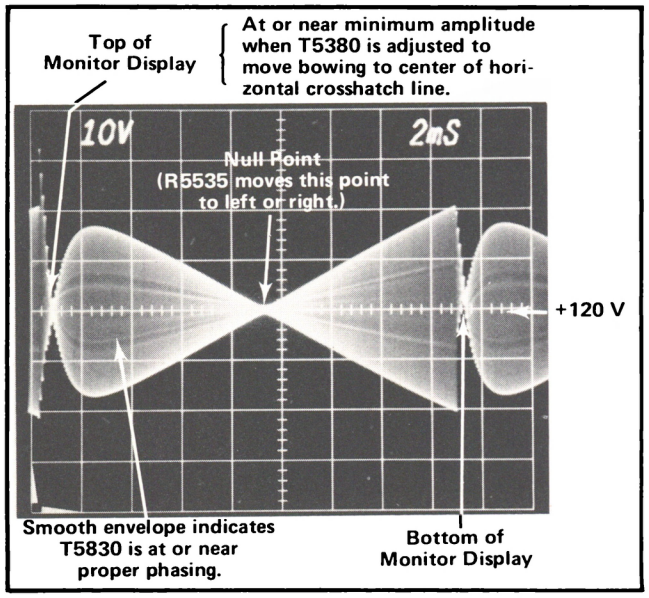

Top of Monitor Display
At or near minimum amplitude when T5380 is adjusted to move bowing to center of horizontal crosshatch line.
10V
2mS
Null Point
(R5535 moves this point to left or right.)
+120 V
Smooth envelope indicates T5830 is at or near proper phasing.
Bottom of Monitor Display

Fig. 6-22. Waveform obtained at TP5831 on Deflection board when checking top and bottom pincushion. R5540 determines the waveform amplitude.

f. REPEAT—parts d and e of this step, as necessary, to obtain straight horizontal lines with minimum tilt. Observe the monitor and oscilloscope displays while performing the adjustments.

g. Disconnect the probe tip from TP5831.

20. Check/Adjust Vertical Expand Side Pincushion and Tilt

a. Use the same setup as described in parts a, b, d, e, f, and g in Step 16.

b. Depress the SCAN Vert Delay pushbutton.

c. CHECK—the vertical lines of the crosshatch pattern display for straight vertical lines at the left and right sides of the display; that is, free of objectionable tilt and bowing.

d. ADJUST—the Vert Expand Tilt (R5776) adjustment (see Fig. 6-20) for minimum tilt of the vertical lines at the left and right sides of the crosshatch pattern display.

e. ADJUST—the Vert Expand Side Pin (R5575) adjustment for minimum bowing of the vertical lines at the left and right sides of the display.

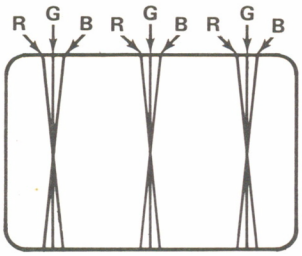
f. Set the SCAN Vert Delay pushbutton to Normal, turn off the incandescent light, and remove the linearity graticule. Set the RED and BLUE SCREEN switches to ON.

CONVERGENCE

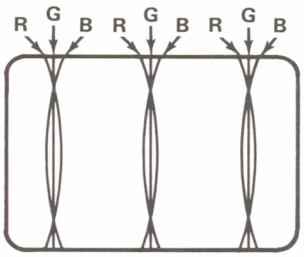
21. Check/Adjust Monitor Display Convergence

a. Display a convergence crosshatch pattern on the monitor.

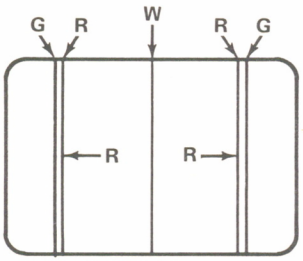
b. Check that all the left front-panel SCREEN switches are set to ON.



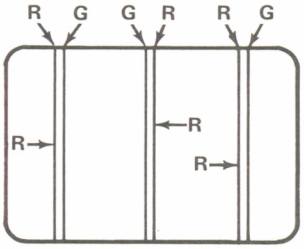
(A) Horiz Conv Skew R5530.



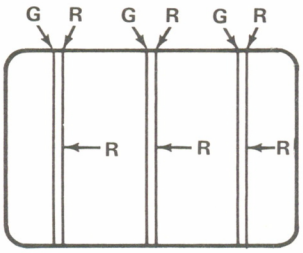
(B) Horiz Conv Bow R5630.



(C) HORIZONTAL TILT R7401.
*Red lines move away from center.



(D) Horiz Conv Parabola R5318.
*Red lines move toward each other on one-half of screen; they move away from each other on other half of screen.



(E) HORIZONTAL STATIC R7303
*Red lines move in same direction.

*Blue lines (not shown) move opposite to red.
NOTE: Vertical convergence controls perform the same function for vertical convergence.

Fig. 6-23. Illustrations showing effect of horizontal convergence adjustments and yoke orientation on the display.

c. CHECK—that the convergence error is less than 1 mm within the central area bounded by a circle whose diameter equals the picture height. Outside the central area, color separation (misconvergence) should be less than 2 mm. Measurement is made from the center of one color line to the center of the other color line. Figure 6-23 illustrates the various convergence errors that may exist, and effects of the horizontal convergence adjustments.

d. Set the GREEN SCREEN switch to OFF.

e. ADJUST—the Horiz Conv Skew (R5530), Bow (R5630), and HORIZONTAL STATIC (R7303) adjustments (see Fig. 6-20) and the monitor left front panel for best convergence (least color separation), comparing their effects as illustrated in Fig. 6-23(A), (B), and (E). Then, adjust HORIZONTAL TILT (R7401), Side Conv Parabola (R5318), and readjust HORIZONTAL STATIC (R7303). Also, adjust the gray static convergence magnets (see Fig. 6-19); leave the white convergence magnets in their centered position.

NOTE

R5530 and R5630 are vertical rate adjustments; R7401 and R5318 are horizontal rate adjustments.

f. Using ac coupling, connect the test oscilloscope probe tip to TP5400 (see Fig. 6-20).

g. CHECK—for signal limiting at the dynamic range of the Output Amplifier. If there is signal limiting, move one of the P5070 connectors (see Fig. 6-20) to an adjacent pin and readjust HORIZONTAL TILT (R7401) to eliminate the limiting condition.

h. READJUST—the adjustments given in part e of this step.

i. Set the GREEN SCREEN switch to ON.

j. CHECK—the green screen display size. If the size is not the same as the converged red and blue screens, move the P5070 connectors away from or toward each other one pin.

k. RECHECK—the display convergence. If necessary, repeat the adjustments that will improve convergence.

22. Adjust VERTICAL STATIC, TILT, and Convergence Parabola

a. Display a convergence crosshatch pattern on the monitor.

b. Precheck convergence error. Error should be within the specification described in Step 21, part c.

c. ADJUST—VERTICAL STATIC (R7307) and VERTICAL TILT (R7403) for best convergence. Also, adjust the Vert Conv Parabola (R5675) adjustment. Fig. 6-20 shows the location of R5675. R7307 and R7403 are located on the monitor left front panel.

23. Adjust Deflection Yoke.

a. Display a convergence crosshatch pattern on the monitor.

b. GENERAL INFORMATION—The vertical convergence along the entire line is affected by the direction that the front of the deflection yoke is pointing. As the red and blue lines are misconverged, a parabolic separation will be noted. The center of the separation is affected by moving the front of the yoke sideways. The curvature of the parabola at convergence is affected by moving the front of the yoke up and down.

c. INSTRUCTIONS—Before moving the yoke, note the location of the yoke assembly on the neck of the kinescope.

WARNING

In the area of the deflection yoke adjustments, potentially hazardous voltages exist. Before loosening the yoke clamp and mounting screws, be sure that the monitor is turned off. When moving the yoke for adjustments, be especially cautious of exposed connections.

Turn the monitor off, loosen the yoke clamp, loosen the four yoke mounting screws (see Fig. 6-19), and then turn the monitor on.

Move the front of the yoke to obtain best convergence. Tighten the two top mounting screws. Turn the monitor off and tighten the two bottom mounting screws. Turn the monitor on.

Check that the yoke is correctly positioned on the neck of the kinescope so that purity is not affected, and check that the display is aligned vertically. Tighten the yoke clamp. If the front of the yoke has been moved as previously described, recheck horizontal linearity and convergence as described in Steps 16 and 21.

d. If the corners of the display need to be improved at this point, insert convergence strips (Tektronix Part No. 124-0300-00) between the yoke and kinescope. Use one strip per corner where needed. Figure 6-19 shows the location of a convergence strip.

e. If convergence needs further improvement, repeat Steps 21 through 23(d) until the error is minimum and within the specification described in Step 21(c). Recheck purity per instructions in Step 14.

24. Check/Adjust Underscan Horizontal Static Convergence

a. Display a convergence crosshatch pattern on the monitor.

b. Set the SCAN Size pushbutton to Underscan.

c. CHECK—that the convergence error is within the specification given in Step 21, part c.

d. ADJUST—the Underscan Horiz Static (R5435) adjustment (see Fig. 6-20) for best convergence of the center vertical crosshatch lines.

e. Set the SCAN Size pushbutton to Full and disconnect the convergence crosshatch signal.

SCREEN

25. Check/Adjust SCREEN BIAS and Screen Volts

NOTE

If you are starting the procedure at this point, perform Step 9 first.

a. Supply a 10 IRE flat field signal to the monitor VIDEO INPUT A connector, and terminate the other loop-through connector in 75 Ω.

b. Depress the NTSC TEST pushbutton, if it is not already in.

c. Dc couple the test oscilloscope probe tip to the blue output (TP6235) (see Fig. 6-13). Set the BLUE SCREEN BIAS adjustment (R7105) fully counterclockwise.

d. CHECK—that the blanking level of the blue output is located between 5 V and 7 V below the black limit (see Fig. 6-24).

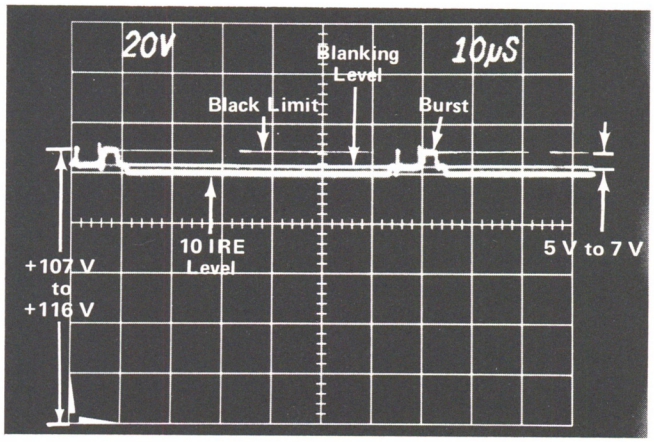


Fig. 6-24. Waveform obtained at blue output TP6235 when the blanking level is set 5 V to 7 V below the black limit. The waveform at TP6215 and TP6219 appear similar to this one, except burst amplitude will be very low.

e. ADJUST—the BLUE SCREEN BIAS adjustment (R7105) slowly clockwise until the waveform starts to become uncompressed. Carefully adjust the control until the blanking level is located 5 V to 7 V below the black limit.

f. CHECK—that the black limit dc level is between +107 V and +116 V.

g. Dc couple the test oscilloscope probe tip to the red output (TP6215).

h. CHECK—that the blanking level of the red output is the same as that observed in part d of this step.

i. ADJUST—the RED SCREEN BIAS adjustment (R7003) for the same condition as described in part e of this step. Check that the black limit dc level is as described in part f.

j. Dc couple the test oscilloscope probe tip to the green output (TP6219).

k. CHECK—that the blanking level of the green output is the same as that observed in part d of this step.

l. ADJUST—the GREEN SCREEN BIAS adjustment (R7103) for the same condition as described in part e of this step. Check that the black limit dc level is as described in part f.

m. Disconnect the test oscilloscope probe from the monitor.

n. Turn off the room lights. Set the monitor VERT SCAN switch to SETUP and check that all the SCREEN switches are set to ON.

o. ADJUST—the Screen Volts adjustment (R6785) (see Fig. 6-21) so that a color is just visible. The two colors for the screens that are not yet visible are the non-dominant colors.

p. Change the generator controls so that a 20 IRE flat field signal is applied to the monitor. Set the monitor VERT SCAN switch to NORMAL.

q. Hold the reference light-source so that the light pipe is place against the monitor faceplate at the center of the screen. Set the brightness of the light-source reference field to match the brightness of the test spot.

r. ADJUST—the two non-dominant color SCREEN BIAS controls so that the color of the test spot matches the light-source reference field.

The Screen Volts (R6785) adjustment is used as a range adjustment for the three front-panel BIAS controls.

26. Adjust Screen Gain Controls

a. Set the monitor front-panel RED and BLUE GAIN controls (R7001 and R7201) to midrange.

b. Apply a 100 IRE flat field signal from the generator to the monitor VIDEO INPUT A connector (if the reference light-source has a 30 footlambert setting). If the reference light-source output is less than 30 footlamberts, set the generator for a flat field signal output that is within the range of the reference light-source. Terminate the other VIDEO INPUT A loop-through connector in 75 Ω.

c. ADJUST—the Red Gain Adj (R4419), Blue Gain Adj (R4449), and Green Gain Adj (R4479) (see Fig. 6-16) until the test spot matches the color temperature of the reference light-source.

d. REPEAT—Steps 25 (part o), 26 (part b), and 26 (part c) to obtain the proper low- and high-light color temperature.

e. OPTIONAL CHECK—If the reference light-source or optical comparator cannot be used to verify the 30-footlambert measurement, then use a photometer or luminance meter. Steps 1 through 7 of the Color Temperature Matching Procedure in Fig. 2-5 of the Operating Instructions section describe how to use a TEKTRONIX J16 Digital Photometer for measuring luminance and irradiance.

OPTIONAL CHECKS

27. Check Chrominance-to-Luminance Delay

a. Display a standard color bar signal on the monitor.

b. Set the monitor MODE switch to COLOR. Turn off the monitor, remove U2125 (see Fig. 6-5), and turn on the monitor.

NOTE

If your generator has a Burst Synchronization switch, turn this switch off instead of removing U2125.

c. Connect the test oscilloscope 10X probe to TP2865 on the NTSC Decoder board (Fig. 6-5).

d. CHECK—the delay time between the green-magenta transition at TP2865 and the green-magenta transition at each of these test points: TP2739, TP2727, and TP2725. The chrominance-to-luminance delay should be within 30 ns for each measurement, and the delay of the color difference signals should be within 30 ns of each other.

NOTE

When the test oscilloscope probe is connected to TP2865, the green-magenta transition is easily discernible if the test signal generator R-Y and B-Y Color Bar switches are set to Off. After positioning the green-magenta transition to a reference point on the oscilloscope crt, set the generator R-Y and B-Y switches to On and the Y (Luminance) switch to Off. Then, connect the oscilloscope probe to each of the remaining test points given in part d of this step to measure delay time.

e. If the delay time for each measurement is not within 30 ns when performing part c of this step, this indicates that the Chroma Filter and R-Y & B-Y Chroma Filters require adjustment (see Adjustment Procedure).

f. Turn off the monitor, install U2125, and turn on the monitor. (Or, turn the generator Burst Synchronization switch on).

28. Check Luminance Channel Amplitude Linearity

a. Display an unmodulated staircase or a color bar signal with chrominance turned off.

b. Press in the monitor MODE B&W pushbutton.

c. Connect the test oscilloscope 10X probe to the signal source. Adjust the test oscilloscope vertical controls to align the first and last steps with the graticule lines for use as a reference. Note the amplitude of each step.

d. CHECK—the amplitude linearity of the luminance signal on the Kinescope Socket board (see Fig. 6-13), using the following procedure:

Connect the test oscilloscope probe to each of these test points: TP6215, TP6219, and TP6235. (The display will be inverted from that noted in part c. If your test oscilloscope vertical channel has an Invert switch, this may be used to return the polarity of the signal to that noted in the reference waveform.) At each test point, use the oscilloscope vertical controls to align the first and last steps with the graticule lines used in part c of this step. Check that the amplitude of each step matches the signal-source step amplitude within a tolerance of 2%.

e. Set the MODE pushbutton to AUTO.

29. Check MODE Pushbuttons

a. Display a 1 V p-p standard color bar signal on the monitor. Check that the monitor MODE pushbuttons are set to AUTO.

b. Connect the test oscilloscope probe to TP2371 on the NTSC Decoder board (see Fig. 6-5).

c. Set the monitor CHROMA control just out of the detent position and then rotate the control slowly clockwise until the color bars displayed by the monitor have color.

d. CHECK—the test oscilloscope display. The burst amplitude should be approximately 200 mV.

e. Rotate the monitor CHROMA control slowly counterclockwise until a point is reached where the color bars do not have any color.

f. CHECK—the test oscilloscope display. The burst amplitude should be approximately 100 mV.

g. Depress the monitor COLOR pushbutton.

h. CHECK—that the color bars have color.

i. Press in the monitor MODE B&W pushbutton and set the CHROMA control to the PRESET position.

j. CHECK—that the color bars do not have any color.

k. Set the monitor MODE pushbuttons to AUTO. Disconnect the test oscilloscope probe from the test point.

30. Check Sync and Timing

a. Use the same setup as described in Step 29, part a.

b. Set the front-panel SYNC pushbutton to EXT for several seconds and then back to INT.

c. CHECK—that the monitor display locks in quickly.

31. Check Residual Subcarrier

a. Use the same setup as described in Step 29, part a.

b. Insert a bnc T connector between the generator and the coaxial cable going to the picture monitor. Connect the generator subcarrier output signal through a variable attenuator (see Fig. 6-1) to the bnc T connector. Use the test oscilloscope to monitor the composite video signal applied to the monitor. Fig. 6-25 illustrates the setup.

c. Check that the Chroma Ref jumper P2097 on the NTSC Decoder board (see Fig. 6-5) is set to the Int position (pins 1 and 2 jumpered).

d. CHECK—that the colors displayed by the monitor change as the residual subcarrier amplitude is varied from 5 mV to 100 mV. This amplitude variation can be determined by observing the subcarrier component on the white reference portion of the test oscilloscope displayed waveform as the variable attenuator is varied.

e. Move the Chroma Ref jumper P2097 to the Ext position (pins 2 and 3 jumpered).

f. CHECK—that the colors displayed by the monitor do not change as the residual subcarrier amplitude is varied within the range described in part d of this step.

g. Return jumper P2097 to the Int position. Disconnect the generator signals and the test oscilloscope probe from the monitor.

32. Check Sync Stripper

NOTE

In this step, the upper signal level (2 V p-p for internal sync and 8 V p-p for external sync) is obtained by not terminating the output of the generator. When checking the lower signal level (0.5 V p-p), the variable attenuator (see Fig. 6-1) is inserted in the signal line and is used to set the signal to 0.5 V p-p. The variable attenuator should not be connected in the signal line when checking the upper signal level.

a. Connect a 75 Ω cable from the video signal source to the monitor VIDEO INPUT A connector. Terminate the other VIDEO INPUT A loop-through connector in 75 Ω. Set the generator to provide a 100 IRE flat field composite video signal.

b. Connect the test oscilloscope probe tip to TP1657 on the Video Input & Sync board (see Fig. 6-3). Note the blanking and sync tip dc levels as displayed on the test oscilloscope.

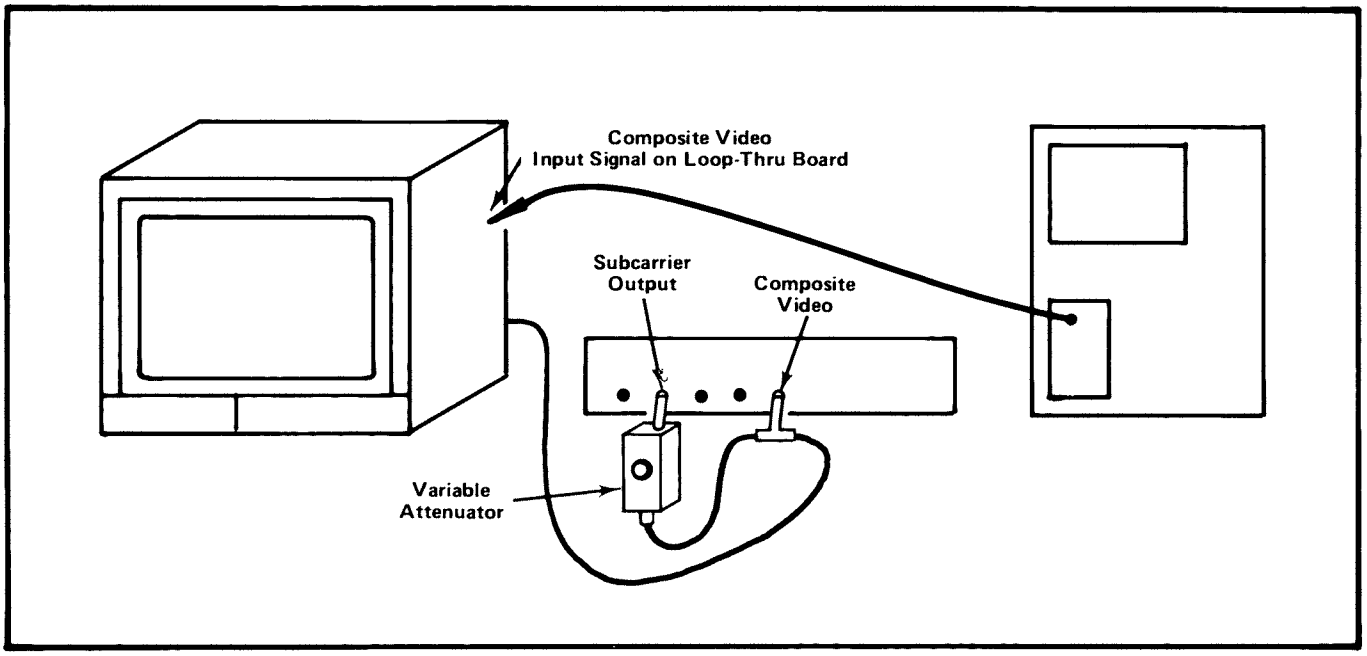


Fig. 6-25. Setup for checking residual subcarrier.

c. CHECK—that the blanking and sync tip dc levels do not change as the signal applied to the monitor is varied from 0.5 V p-p to 2 V p-p. (Remove the 75 Ω termination from the VIDEO INPUT A connector to check at 2 V p-p. Leave the termination off and connect the variable attenuator in the signal line. Set the variable attenuator to provide a 0.5 V p-p signal at the input, while monitoring the input level with the test oscilloscope. Then reconnect the probe tip to TP1657 to check for any change from that noted in part b.)

d. Loop the 100 IRE flat field signal through the monitor EXTERNAL SYNC A connector to the VIDEO INPUT A connector. Set the monitor front-panel SYNC pushbutton to EXT.

e. CHECK—that the blanking and sync tip dc levels do not change as the signal applied to the monitor is varied from 0.5 V p-p to 2 V p-p. Use the same method as described in part c.

f. Disconnect the flat field signal from the EXTERNAL SYNC A connector. Connect this signal to VIDEO INPUT A and terminate the other VIDEO INPUT A loop-through connector in 75 Ω. Apply a composite sync signal from the generator to the EXTERNAL SYNC A connector.

g. CHECK—that the blanking and sync tip dc levels do not change, within a tolerance of ±0.1 V, as the composite sync signal applied to the EXTERNAL SYNC A connector is varied from 0.5 V p-p to 8 V p-p. Use the same method as described in part c.

h. Set the SYNC switch to INT and disconnect the composite sync signal from the monitor.

i. Disconnect the test oscilloscope probe from TP1657.

33. Check High-Voltage Regulation

a. Display a combined signal consisting of a 100 IRE flat field signal applied to one of the VIDEO INPUT A loop-through connectors and a convergence crosshatch pattern signal applied to the other VIDEO INPUT A connector.

b. Set the CONTRAST control to a point just before the OVERLOAD light turns on. If desired, place the linearity graticule over the face of the kinescope. Note the size of the display.

c. CHECK—for less than 1% change in display size as the CONTRAST control is turned slowly counterclockwise from this point.

d. Set the CONTRAST control to PRESET. Remove the linearity graticule, if used, and the input signals.

34. Check Return Loss

CHECK—return loss at each pair of loop-through connectors for at least 46 dB return loss to 5 MHz, power on or off, input in use or not.

One method for measuring return loss is to use a device such as the Tektronix 015-0149-00 Return Loss Bridge. The instruction manual supplied with the bridge describes the measurement procedure.

Another method for measuring return loss is to use a setup similar to the one shown in Fig. 6-26. To use this setup, note the amplitude of the waveform on a video waveform monitor (such as the TEKTRONIX 1480-Series or Type 528 Waveform Monitor) when the 670A Monitor is not connected to the end of the 30-foot 75-ohm coaxial cable. Then, note the waveform amplitude when the 670A Monitor is connected to the cable. The waveform amplitude displayed by the video waveform monitor should be within ±0.5% of the amplitude noted when the picture monitor is disconnected.

This completes the Performance Check Procedure for the 670A NTSC Monitor. If the instrument has met or exceeded the requirements stated in each CHECK step of the procedure, the instrument will meet the advertised electrical performance requirements.

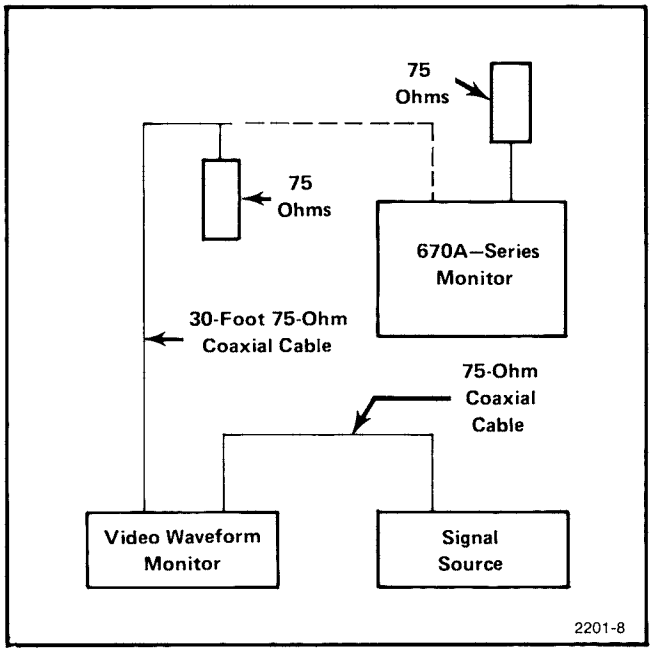


Fig. 6-26. Setup for measuring return loss.

671A (PAL) MONITOR PERFORMANCE CHECK/ADJUSTMENT PROCEDURE

PAL CALIBRATION INDEX

Table 6-5 serves as an index to the PAL Performance Check/Adjustment Procedure, and is intended to make any desired check or adjustment easy to locate within the procedure. This table may also be used as an adjustment guide for the experienced service technician.

Table 6-5

ADJUSTMENTS, CHECKS, & SELECTED COMPONENTS FOR PAL PICTURE MONITOR

Step No.	Adjustment Name	Circuit No.
	LV POWER SUPPLY	
1	−15 V Adjust	R8121
	VIDEO CHANNEL	
2	Ch A Input Comp Ch B Input Comp	C1937 C1909
3	Aperture Zero Aperture Preset	R148 R7710
4	Luminance Gain	R3880
5	Chroma Trap	L3790
6	Chroma Filter	L3770
7	U Filters V Filters Alt V Filters	L3608 & L3610 L3630 & L3640 L3644 & L3650
8	Dc Offset	R1713
9	Contrast Preset Min Gain Adj	R7707 R1409
10	Brightness Preset Check Brightness Range	R7705
11	V Phase Error Amp Dc Bal V Tilt	C3314 R3030 C3310
12	Quad Phase	L3110
13	Chroma Preset	R7803
14	B-Y Gain	R3910
15	G-Y Gain U Gain (G-Y Phase)	R3930 R3510
16	Transducer Peaking Delay Line Quad Phase	L3380 & L3480 C3480
17	Low Amp Delay Line Phase Low Amp Delay Line Gain	R3054 R3052 Select R3586
18	Delay Line Gain	R3544
	DEFLECTION, CONVERGENCE, & SCREEN Refer to Steps 14 through 26 in the 670A NTSC Monitor procedure.	
19	**OPTIONAL CHECKS** Check Chrominance-to-Luminance Delay (For additional checks, refer to Steps 28 through 34 in the 670A NTSC Monitor procedure).	

Introduction

The 671A PAL Monitor uses much of the same circuitry as the 670A NTSC Monitor, with the main exception being the Decoder circuit board. For convenience when performing a Performance Check or an Adjustment Procedure, all steps that are common to both instruments are repeated in the following procedure along with the steps that apply to the 671A only.

Illustrations that are common to both instruments are located in the NTSC procedure, with the main exception, again, being the Decoder board.

Most test equipment required for checking and adjusting the 671A is identical with the equipment used in the NTSC procedure. Differences are listed below.

Test Equipment Required

All items listed under 'Test Equipment Required' near the beginning of this section, with the following changes:

CHANGE

Item #

4. Video Signal Source. Capable of providing composite video signals, including standard European PAL color bars (1 V p-p, 100% saturated, 75% amplitude, 0% setup). Also, staircase, crosshatch pattern, and flat field or window signal. For example, a TEKTRONIX 145 PAL Gen-Lock Test Signal Generator.

5. Linearity Graticule (625/50). Tektronix Part No. 331-0359-01.

ADD:

19. Resistor, 4.3 kΩ, 1/4 W, 5%. Tektronix Part No. 315-0432-00.

Preliminary

Before connecting the instrument to a power source, check the rear panel to find the operating voltage for which the instrument has been set (see Fig. 2-1 in the Operating Instructions section of this manual). Check that the transformer is wired for the line voltage to be applied, and that the correct line fuse is in place.

Check that the jumper connectors on the PAL Decoder and the Video Input & Sync boards are set to their factory-set positions as shown in Figs. 4-3 and 4-4 of the Operating Changes portion of the Installation section in this manual.

Connect the Voltage Control Unit to an ac power outlet. Connect the 671A ac power cord to the output of the Voltage Control Unit, and turn the 671A POWER switch ON. Set the Voltage Control Unit output to 230 Vac (or 115 Vac if this is the center line voltage to be used).

Set the monitor slide switches to their 'up' positions. Set the right front-panel variable controls to PRESET and check that all pushbuttons are set to the 'out' position.

Allow the 671A and all test equipment 30 minutes warmup at 25° C, ±5° C, before starting the procedure.

This procedure refers you to the illustrations provided in the NTSC procedure for test points and adjustment locations on all boards except the decoder. Use the waveforms in the NTSC procedure as a guide when checking or adjusting the 671A Monitor. Since a 0% setup color bar signal is applied to the 671A (rather than 7.5% setup as used in NTSC), the signal black level will be equal to the video signal blanking level when viewing these waveforms on the test oscilloscope crt.

If the monitor has vector signal outputs (Option 2), monitoring these signals on a suitable X-Y display unit while adjusting is useful when analyzing the success of the adjustments.

LV POWER SUPPLY

1. Check/Adjust −15 V, +5 V, +15 V, and +120 V Supply Voltages and Regulation

a. Connect an accurate dc voltmeter between chassis ground and TP8051 (see Fig. 6-2).

b. CHECK—for a meter reading of −15 V within a tolerance of ±1% (−14.85 V to −15.15 V).

c. ADJUST—the −15 V Adjust (R8121) control (see Fig. 6-2) to obtain a meter reading of −15 volts, ±0.5%.

d. CHECK—regulation of the −15 V supply. Should remain within 1% as the input voltage is varied between 207 Vac and 253 Vac (230 Vac, ±10%).

NOTE

The −15 V supply is the reference supply for the other supplies in the instrument. This voltage must be within tolerance for the other supplies to meet their specification of ±3%.

e. CHECK—accuracy and regulation of the +5 V, +15 V and +120 V supplies, referring to Table 6-6 and Fig. 6-2 for test points and accuracy specification. Check regulation between 207 Vac and 253 Vac.

Table 6-6

TEST POINTS AND ACCURACIES

Supply	Test Point	Limits
+5 V	TP8153	4.85 to 5.15 V
+15 V	TP8047	14.55 to 15.45 V
+120 V	TP8053	116.4 to 123.6 V

NOTE

The kinescope anode supply is 24 kV, ±1 kV. Tuning the High-Voltage Oscillator, which affects the anode supply voltage, is described in the Maintenance section of this manual.

WARNING

Measurement of the anode supply is difficult to achieve safely, and is not recommended.

f. Disconnect the voltmeter. Disconnect the monitor from the Voltage Control Unit, and connect the monitor ac power cord to a suitable ac power source.

VIDEO CHANNEL

2. Check/Adjust Channels A and B Input Compensation

a. Apply a convergence crosshatch pattern signal through a feed-through termination and a dual-input coupler to the monitor VIDEO INPUT A AND B connectors. Check that the INPUT switch is set to A.

b. Using ac coupling, connect the test oscilloscope probe tip to TP1317 on the Video Input & Sync board (see Fig. 6-3). Externally trigger the test oscilloscope time base from the signal generator composite sync output.

c. CHECK—that the pulses (vertical crosshatch lines) are the same amplitude as the bar (horizontal crosshatch line) as shown in Fig. 6-4. Set the monitor INPUT switch to B, and check for the same results.

d. ADJUST—C1909 so that the pulses are the same amplitude as the bar. Set the input switch to A, and adjust C1937 for the same results.

e. Remove the dual-input coupler and feed-through termination.

3. Check/Adjust Aperture Zero and Preset

a. Apply a convergence crosshatch pattern signal to the monitor VIDEO INPUT A connector. Connect a 75 Ω termination to the other VIDEO INPUT A loop-through connector. Set the monitor INPUT switch to A.

b. Using dc coupling, connect the test oscilloscope probe tip to TP3960 on the PAL Decoder board (see Fig. 6-27).

c. Check that Bandpass jumper P3790 on the board is set to the Narrow position; pins 1 and 2 are jumpered.

d. Set the right front-panel APERTURE control just out of the PRESET detent position (minimum aperture correction).

e. CHECK—that the pulses (vertical crosshatch lines) are the same amplitude as the bar (horizontal crosshatch line) as observed on the test oscilloscope (see Fig. 6-6A).

f. ADJUST—the Aperture Zero (R148) adjustment (see Fig. 6-7) so that the pulses are the same amplitude as the bar.

g. Set the front-panel APERTURE control to the PRESET position.

h. CHECK—that the pulses (vertical crosshatch lines) are 20% greater in amplitude than the bar (horizontal crosshatch line) as observed on the test oscilloscope (see Fig. 6-6B). NOTE: The user may prefer to have Aperture Preset adjusted to some other level than described here.

i. ADJUST—the Aperture Preset (R7710) adjustment (see Fig. 6-8) so that the pulses are 20% greater in amplitude than the bar (or other amplitude, as preferred by the user).

j. Disconnect the crosshatch pattern signal from the monitor.

NOTE:

PAL decoder matrix board removed to show adjustment and test point locations. If desired, the instrument can be calibrated with matrix board removed and connectors plugged onto the main PAL board.

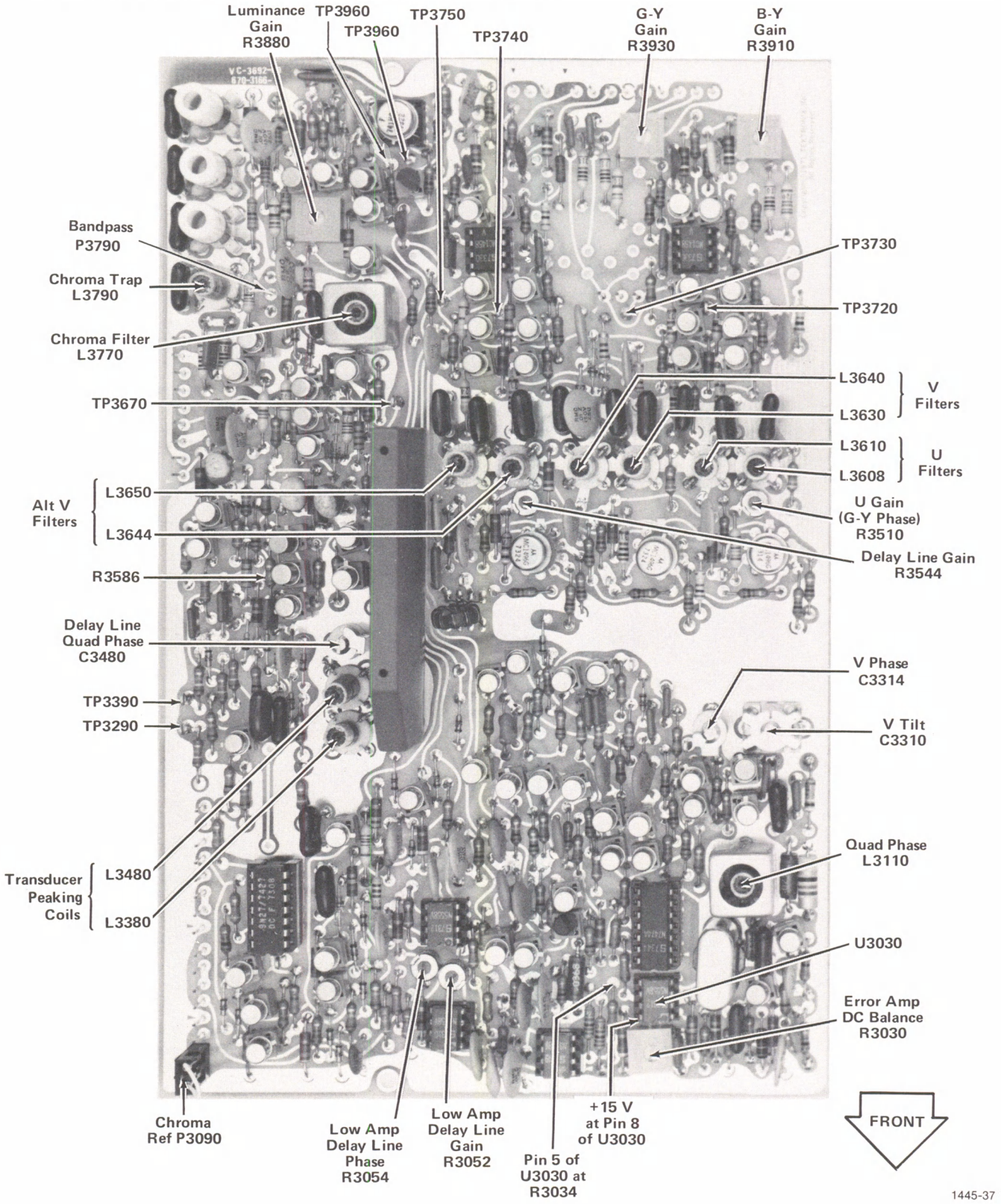


Fig. 6-27. PAL Decoder board.

4. Check/Adjust Luminance Gain

a. Apply a 1 V, 100% white reference, 75% amplitude, 0% setup signal from the generator to the monitor VIDEO INPUT A connector. Terminate the other VIDEO INPUT A loop-through connector in 75 Ω.

b. Using dc coupling, connect the test oscilloscope probe tip to TP3960 on the PAL Decoder board (see Fig. 6-27).

c. CHECK—that the waveform amplitude is 2 V from setup (black level) to the 100% white level.

d. ADJUST—the Lum Gain (R3880) adjustment (see Fig. 6-27) so that the waveform amplitude is 2 V from setup to the 100% white level.

NOTE

If the color bar signal in use has a 75% white reference, the waveform amplitude should be set for 1.5 V from setup to the 75% white level.

5. Check/Adjust Chroma Trap

a. Use the same setup as described in parts a and b of Step 4.

b. CHECK—for minimum chrominance amplitude on the luminance steps; typically 100 mV or less.

c. ADJUST—the Chroma Trap (L3790) adjustment (see Fig. 6-27) for minimum chrominance amplitude on the luminance steps.

6. Check/Adjust Chroma Filter

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to TP3670 (see Fig. 6-27).

c. CHECK—for maximum chrominance amplitude on the luminance steps; should be 0.9 V to 1 V p-p.

d. ADJUST—the Chroma Filter (L3770) for maximum chrominance amplitude.

NOTE

If the chroma filters in Steps 6 and 7 are adjusted, check chrominance-to-luminance delay as described in Step 19.

7. Check/Adjust U, V, and Alt V Filters

a. Use the same setup as described in part a of Step 4.

b. Turn the monitor off and remove U3030 (see Fig. 6-27). Turn the monitor on. Set the MODE pushbuttons to COLOR. Check that the SIMPLE-DELUXE pushbutton is set to SIMPLE.

NOTE

If your video signal generator has U and V Burst switches, turn these switches off instead of removing U3030.

c. Using ac coupling, connect the test oscilloscope probe tip to TP3720 on the PAL Decoder board (see Fig. 6-27). Check that the oscilloscope is externally triggered from the generator Comp Sync signal.

Locate the green-magenta transition as shown in Fig. 6-10A. (Sweep rate of the test oscilloscope should be 10 μs/div.) Position the green-magenta transition on the graticule centerline, then turn on the oscilloscope X10 magnifier. The display should be similar to Fig. 6-10B.

d. CHECK—for good transient response to the green-magenta transition. The transient response should be free of noticeable overshoot or rounding, similar to Fig. 6-10B.

e. ADJUST—U Filters (L3608 and L3610) for best transient response at the green-magenta transition.

f. Move the probe tip to TP3740.

g. CHECK—for good transient response at the green-magenta transition.

h. ADJUST—V Filters (L3630 and L3640) for best transient response at the green-magenta transition.

i. Move the probe tip to TP3750.

j. CHECK—for good transient response at the green magenta transition.

k. ADJUST—Alt V Filters (L3644 and L3650) for best transient response at the green-magenta transition.

l. Turn the monitor off, install U3030, and then turn on the monitor. (Or, turn the generator U and V Burst switches on.)

8. Check/Adjust Dc Offset

a. Use the same setup as described in part a of Step 4.

b. Using dc coupling, connect the test oscillosocope probe tip to TP1531 on the Video Input & Sync board (see Fig. 6-3).

c. CHECK—that the setup (black level) of the waveform is equal to 0 V (similar to Fig. 6-11).

d. ADJUST—the Dc Offset (R1713) adjustment so that the setup level of the waveform is equal to 0 V.

9. Check/Adjust Contrast Preset and Min Gain Adj

a. Use the same setup as described in part a of Step 4.

b. Disconnect P1301 (see Fig. 6-3), and connect a 200 Ω, 1%, resistor from pin 1 to pin 2 on the board at P1301.

c. Using ac coupling, connect the test oscilloscope probe tip to TP1313.

d. CHECK—that the amplitude of the signal, from blanking to the 100% white reference, is 200 mV (similar to Fig. 6-12).

e. ADJUST—the Contrast Preset (R7707) control so that the amplitude of the signal, from blanking to the 100% white reference, is 200 mV.

f. Set the front-panel CONTRAST control to its minimum amplitude position.

g. CHECK—that the waveform is 40 mV from blanking to the 100% white reference. (0.2X the PRESET amplitude of 200 mV.)

h. ADJUST—the Min Gain Adj (R1409) control on the Video Input & Sync board (see Fig. 6-3) so that the waveform is 40 mV from blanking to the 100% white reference.

i. Rotate the CONTRAST control fully clockwise.

j. CHECK—that the waveform amplitude is at least 2X (400 mV) the PRESET amplitude.

NOTE

If U1517 has been replaced, and a CONTRAST control range of 0.2X to 2X cannot be obtained when performing parts h and j of this step, select the values of R1405 and/or R1503 (see Fig. 6-3).

k. Disconnect the 200 Ω resistor and reconnect P1301 to the board pin connections. Set the CONTRAST control to PRESET.

10. Check/Adjust Brightness Range and Preset

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to the red output TP6215 on the Kinescope Socket board (see Fig. 6-13).

c. CHECK—that the black reference level is equal to the video signal blanking level (see Fig. 6-14).

d. ADJUST-the Brightness Preset (R7705) control (see Fig. 6-8) so that the black reference level is equal to the video signal blanking level.

e. CHECK—that the BRIGHTNESS control has an approximate dc range of at least ±25% of the waveform amplitude. Set the BRIGHTNESS control to PRESET.

11. Check/Adjust V Phase, Error Amp Dc Bal, and V Tilt

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to TP3670 on the PAL Decoder board (see Fig. 6-27).

c. Check that the MODE pushbuttons are set to COLOR.

d. Set the CHROMA control to obtain 3X the PRESET chrominance amplitude. Move the probe tip to TP3740.

e. CHECK—that the color bar levels are superimposed.

NOTE

To display PAL overlay of color bars, set the test oscilloscope variable time base control so that the alternating chrominance lines are superimposed as shown in Fig. 6-28A and B. Any separation of the color bar levels due to an incorrect adjustment can then easily be seen as shown in Fig. 6-28A.

f. ADJUST—the V Phase (C3314) adjustment for best overlay of color bar levels.

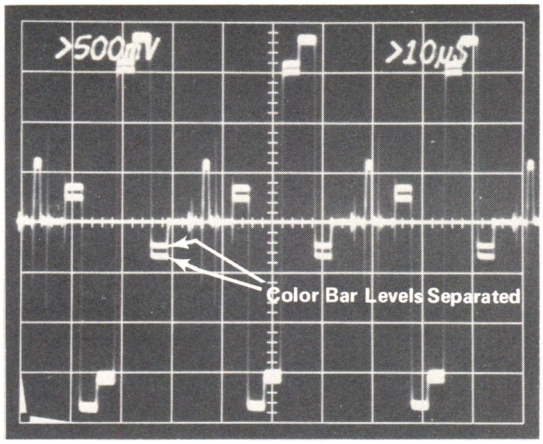
g. Reconnect the test oscilloscope probe tip to TP3670 and set the CHROMA control to obtain 0.5X the PRESET chrominance amplitude. Move the probe tip to TP3740.

h. CHECK—that the color bar levels are superimposed.

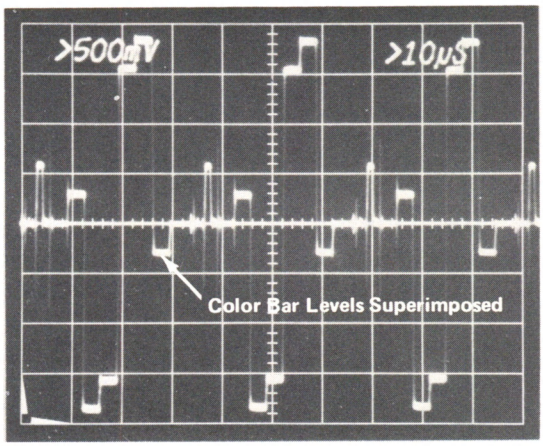
i. ADJUST—the Error Amp Dc Bal (R3030) adjustment for best overlay of color bar levels.

j. INTERACTION——Repeat parts f and i of this step to minimize any interaction.

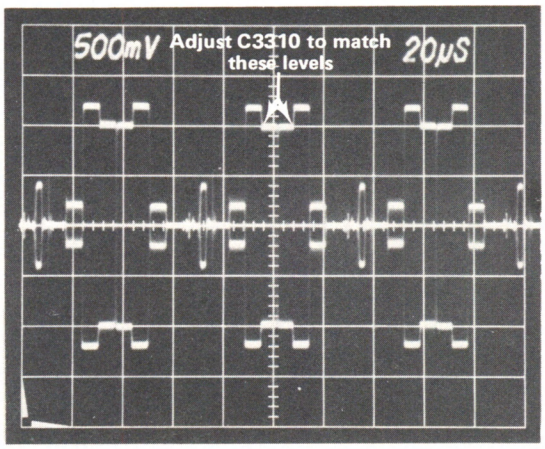
k. Set the CHROMA control to PRESET. Turn the monitor off. Connect a 4.3 kΩ, 1/4 W, resistor between pin 5 of U3030 and +15 V (see Fig. 6-27). Turn the monitor on.



(A) C3314 and R3030 misadjusted to show separation of color bar levels.



(B) C3314 and R3030 properly adjusted.



(C) Display obtained when a 4.3 kΩ resistor is connected from pin 5 of U3030 to +15V. CHROMA control is set to PRESET.

Fig. 6-28. Waveform displays at TP3740 when performing step 11.

If the oscilloscope display is jittery, momentarily set the SYNC pushbutton to EXT, and then back to INT. Interrupting the sync signal in this manner will unlock the subcarrier oscillator so that you should be able to obtain the display shown in Fig. 6-28C.

l. CHECK—that the green-magenta bars are at equal levels as shown in Fig. 6-28C.

m. ADJUST—the V Tilt (C3310) adjustment to match the green-magenta bar levels.

n. Turn the monitor off and disconnect the 4.3 kΩ resistor. Turn the monitor on.

12. Check/Adjust Quad Phase

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to the U output TP3720 (see Fig. 6-27).

c. CHECK—that the color bar levels are superimposed.

d. ADJUST—the Quad Phase (L3110) adjustment for best overlay of color bar levels.

13. Check/Adjust Chroma Preset

a. Use the same setup as described in part a of Step 4.

NOTE

The DEMOD TEST pushbutton should be set to the 'in' position when performing Steps 13 through 18.

b. Using ac coupling, connect the test oscilloscope probe tip to the red output TP6215 (see Fig. 6-13).

c. CHECK—for proper color bar decoding, similar to the waveform shown in Fig. 6-14.

d. ADJUST—the Chroma Preset (R7803) control so that the color bar signal black level is equal to the video signal blanking level.

14. Check/Adjust B-Y Gain

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to the blue output TP6235 (see 6-13).

c. CHECK—for proper color bar decoding. The color bar signal black level should be equal to the video signal blanking level.

d. ADJUST—the B-Y Gain (R3910) adjustment (see Fig. 6-27) for proper color bar decoding.

15. Check/Adjust G-Y Gain and U Gain

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to the green output TP6219 (see Fig. 6-13).

c. CHECK—for proper color bar decoding. The color bar signal black level should be equal to the video signal blanking level.

d. ADJUST—the G-Y Gain (R3930) and U Gain (R3510) adjustments for proper color bar decoding.

16. Check/Adjust Transducer Peaking and Delay Line Quad Phase

a. Use the same setup as described in part a of Step 4.

b. Set the SIMPLE-DELUXE pushbutton to DELUXE.

c. Using dc coupling, connect the test oscilloscope probe tip to TP3390 (see Fig. 6-27).

d. CHECK—the voltage at TP3390. Should be within ±5 V of zero.

e. Turn the monitor off and short TP3290 and TP3390 to the chassis. (If these connections are made while the monitor is on, U3050 or U3156 may be damaged.) Turn the monitor on.

f. Using ac coupling, connect the test oscilloscope probe tip to the V output TP3740.

g. ADJUST—the Transducer Peaking coils (L3380 and L3480) to overlay the color bar levels. Adjust the slugs in equal increments so that the peaking coils will be at approximately the same inductance when finished.

h. Turn the monitor off, and remove the jumper connections that were connected in part e of this step. Turn the monitor on.

i. Using ac coupling, connect the test oscilloscope probe tip to the U output TP3720.

j. CHECK—for overlay of the color bar levels.

k. ADJUST—the Delay Line Quad Phase (C3480) to overlay the color bar levels.

l. RECHECK—the voltage at TP3390 as in part d of this step.

17. Check/Adjust Low-Amplitude Delay Line Phase and Gain

a. Use the same setup as described in part a of Step 4.

b. Using ac coupling, connect the test oscilloscope probe tip to TP3670 (see Fig. 6-27).

c. Note the amplitude of the chrominance signal with the CHROMA control set to PRESET. Then, note the CHROMA control knob settings when it is set ot 0.5X and 3X the PRESET amplitude.

d. Move the probe tip to TP3390 and change the test oscilloscope vertical input to dc coupling.

e. CHECK—that the dc level of the signal does not change as the CHROMA control is varied within the 0.5X to 3X range as established in part c of this step.

f. ADJUST—the Low Amp Delay Line Phase (R3054) to minimize the change in dc level while varying the chroma amplitude.

g. Move the probe tip to TP3290. The test oscilloscope should still be set for dc coupling.

h. CHECK—that the dc level of the signal does not change as the CHROMA control is varied within the 0.5X to 3X range.

i. ADJUST—the Low Amp Delay Line Gain (R3052) to minimize the change in dc level while varying the chroma amplitude.

j. CHECK—the dc voltage at TP3290. Should be within ±10 V of zero.

k. SELECT—the value of R3586 (see Fig. 6-27) if the dc voltage at TP3290 is greater than ±10 V. Increase the value of R3586 to decrease the voltage.

l. Set the CHROMA control to PRESET.

18. Check/Adjust Delay Line Gain

a. Use the same setup as described in part a of Step 4.

b. Check that the SIMPLE-DELUXE pushbutton is set to DELUXE.

c. Using ac coupling, connect the test oscilloscope probe tip to TP6215 (see Fig. 6-13).

d. CHECK—for a match of Deluxe color bar decoding to Simple color bar decoding. A comparison can be made by setting the SIMPLE-DELUXE pushbutton to SIMPLE, and then back to DELUXE.

NOTE

When checking the decoded color bar waveforms at the test points given in this step, check both top and bottom of the color bars for a decoding accuracy of ±3%.

e. ADJUST—the Delay Line Gain (R3544) for the best match of Deluxe to Simple color bar decoding.

f. Move the probe tip to TP6235. The test oscilloscope should still be set for ac coupling.

g. CHECK—for a match of Deluxe to Simple color bar decoding.

PAL

h. ADJUST—B-Y Gain (R3910) for the best match of Deluxe to Simple color bar decoding.

i. Still using ac coupling, move the probe tip to TP6219.

j. CHECK—for a match of Deluxe to Simple color bar decoding.

k. ADJUST—G-Y Gain (R3930) and U Gain (G-Y Phase) (R3510) for the best match of Deluxe to Simple color bar decoding.

DEFLECTION, CONVERGENCE, & SCREEN

To complete the Performance Check/Adjustment Procedure for the 671A PAL Monitor, use Steps 14 through 26 in the 670A NTSC Monitor procedure as a guide. For the 671A Monitor, substitute 10% and 100% white for 20 IRE and 100 IRE flat field signals when checking the SCREEN adjustments.

OPTIONAL CHECKS

19. Check Chrominance-to-Luminance Delay

a. Couple a standard PAL color bar signal from the video test signal generator to the monitor VIDEO INPUT A connector. Set the INPUT switch to A. Terminate the other VIDEO INPUT A loop-through connector in 75 Ω.

b. Set the SIMPLE-DELUXE pushbutton to SIMPLE and the MODE pushbuttons to COLOR. Turn off the monitor, remove U3030 (see Fig. 6-27), and then turn on the monitor.

NOTE

If your video signal generator has U and V Burst switches, turn these switches off instead of removing U3030.

c. Using ac coupling, connect the test oscilloscope probe tip to TP3960 on the PAL Decoder board (see Fig. 6-27).

d. CHECK—the delay time between the green-magenta transition at TP3960 and the green-magenta transition at each of these test points: TP3720, TP3740, and TP3750. The chrominance-to-luminance delay should be within 30 ns for each measurement, and the delay of the color difference signals should be within 30 ns of each other.

NOTE

When the oscilloscope probe is connected to TP3960, the green-magenta transition is easily discernible if the signal source chrominance component is turned off. After positioning the transition to a reference point on the oscilloscope crt, turn on the signal source chrominance component and turn off the luminance component. Connect the probe tip to each of the other test points given in part d of this step to measure delay time.

e. Turn off the monitor, install U3030, and then turn on the monitor. (Or, turn the generator U and V Burst switches on.)

NOTE

For additional optional checks, perform Steps 28 through 34 in the 670A NTSC Monitor procedure. When performing Step 29, use TP3670 (see Fig. 6-27). In Step 31, the Chroma Ref jumper is P3090.

OPTION 2 ADJUSTMENT PROCEDURE (Demodulated Chroma Output Board)

Test Equipment Required

1. Video Signal Source: Capable of providing composite color bar signals (1 V p-p, 75% amplitude, 100% saturated). Field/line rate standard must be appropriate for the monitor being adjusted. (See NTSC and PAL Test Equipment Required lists.)

2. Test Oscilloscope. (See items 2 and 3 in the Test Equipment Required list at the beginning of this section.)

Adjust B-Y or U (R6261) and R-Y or V (R6269)

a. Connect a color bar signal from the video signal source to the monitor VIDEO INPUT A connector. Terminate the other VIDEO INPUT A loop-through connector in 75 Ω. (Make sure that the color bar signal is compatible with the monitor being used.)

b. Set the MODE pushbuttons to COLOR. Check that the INPUT switch is set to A. Check that all the front-panel variable controls are set to PRESET.

c. Turn the monitor off.

For the 670A NTSC Monitor, remove U2125 (see Fig. 6-5.

For the 671A PAL Monitor, remove U3030 (see Fig. 6-27) and set the SIMPLE-DELUXE pushbutton to SIMPLE.

Turn the monitor on.

d. Connect the test oscilloscope probe tip to the monitor B-Y or U connector. Use dc coupling.

e. ADJUST—the B-Y or U (R6261) adjustment (see Fig. 6-30) so that the red color bar amplitude is 700 mV p-p as shown in Fig. 6-29. This amplitude corresponds to a compass rose diameter of 800

f. Connect the probe tip to the monitor R-Y or V connector, using dc coupling.

g. ADJUST—the R-Y or V (R6269) adjustment so that the red color bar amplitude is 700 mV p-p.

h. Reinstall the IC removed from the Decoder board. This completes the Option 2 Adjustment Procedure.

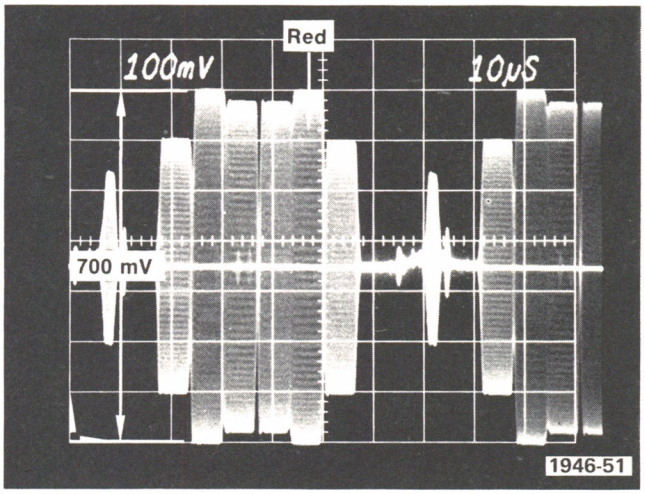


Fig. 6-29. Checking the red color bar for 700 mV p-p amplitude at the R-Y or V and B-Y or U OUTPUT connectors.

OPTION 2

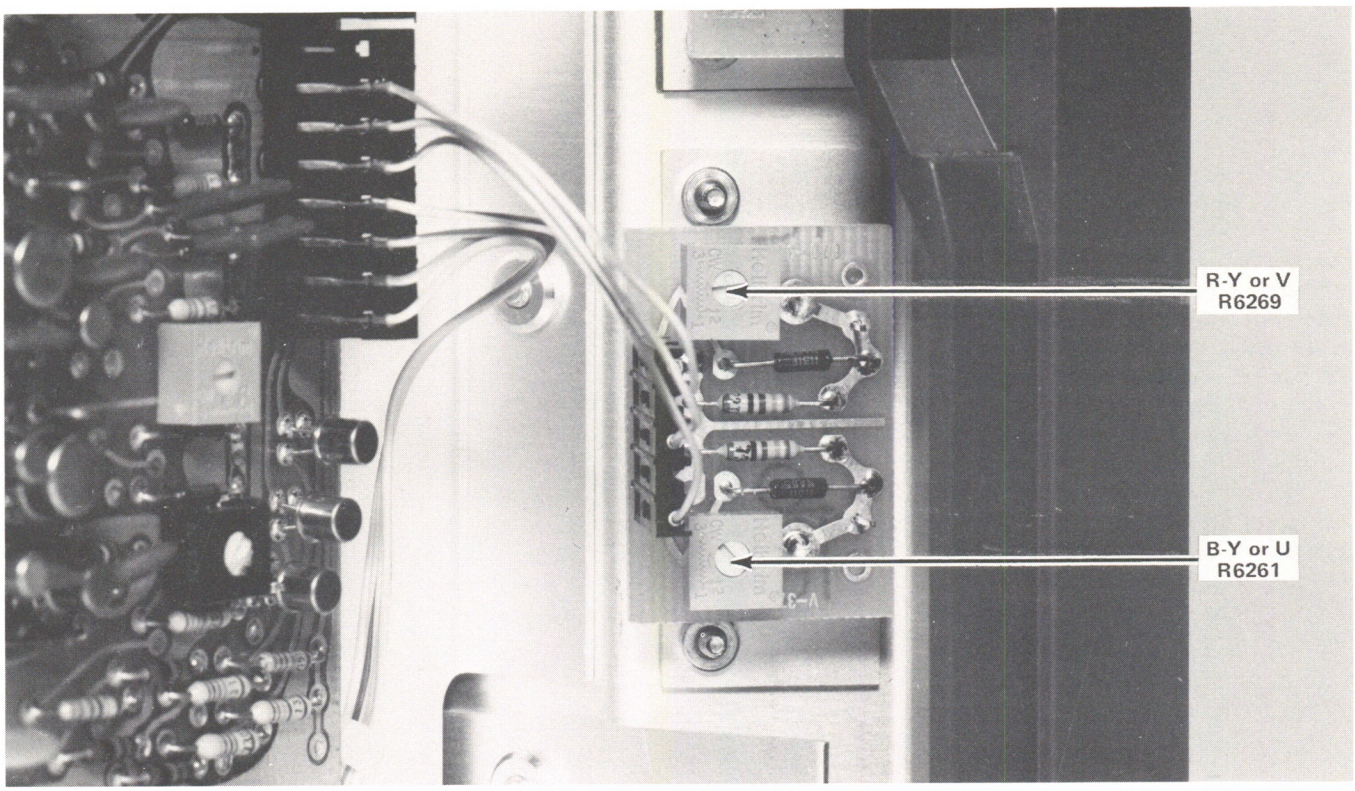


Fig. 6-30. Option 2 Demodulated Chroma Output board.

CIRCUIT DESCRIPTION

This section provides a circuit description for each schematic diagram located on the foldout pages in Section 10. The diagrams are blocked off in stages, according to the function performed by each stage. The circuit function titles in each blocked-off area are used as headings in this circuit description to make it easier for you to identify the circuit area being described.

A brief description of signal flow is included under Block Diagram, followed by a detailed description of the function, signal flow, and operation of each stage. Each sub-part in the description is separated according to schematic number. Refer to the appropriate diagram when reading this description.

BLOCK DIAGRAM

The Block Diagram is intended to show only main signal flow and signal-separation functions as an aid to the troubleshooter in isolating faults to a general area within the instrument. Switching details and operation of circuits within the main blocks are described in more detail in the individual-schematic circuit descriptions.

Video Channel

Two separate composite video input channels are provided (A and B). Selection of the channel to be displayed on the kinescope is made by a front-panel pushbutton.

The channel is selected and amplified in the Video Input Amplifiers stages, and coupled to the Sync & Timing, Aperture Corrector, and Decoder stages. Composite video from the Video Input Amplifiers stage is coupled directly to the Decoder Chrominance Processor & Matrix and to the Aperture Corrector stage. Composite video is also coupled to the Sync & Timing stages, where composite sync is stripped off to drive the Decoder Luminance Processor. Luminance and clamping signals from the Decoder Luminance Processor are then coupled to the RGB Matrix and combined with the Decoder Chrominance signal to form the red, green, and blue signals. These RGB signals are boosted in the Output Amplifiers stage, and then coupled to the kinescope cathodes for drive.

A Variable Aperture Corrector stage picks off composite video from the Video Input Amplifiers stage. The corrector stage provides a selectable amount of phase-linear, mid-frequency boost to the Decoder Luminance Processor stage to enhance picture sharpness.

R, G, and B stages are gated by the Blanking Gate, which is coupled to the Output Amplifiers stage from the Sync & Timing circuitry. Black level is also established in the Output Amplifiers stage by the Black Level Sampling Pulse from the Sync & Timing circuitry.

Sync & Timing

Sync and Timing includes stages for amplification, sync source selection, sync stripping, vertical drive, horizontal afc, and horizontal drive.

Composite video from the Video Input Amplifiers and externally-applied composite sync from EXT SYNC A or B are coupled into the Input Selector in the Sync & Timing (Strip & Vert Drive) block. The selected sync signal passes through a chrominance filter to the Sync Stripper, and then to the Decoder (Lum Proc & Control) and Sync & Timing (Horiz AFC) blocks. Vertical Drive is also generated by a counter stage within the Sync & Timing (Strip & Vert Drive) block and coupled to the Vertical Deflection circuitry.

Horizontal-rate signals are generated within the Sync & Timing (Horiz AFC) block. The 2H-Rate Drive signal is coupled to the Blanking & Kinescope Supply block. This signal serves as a timing reference for the HV Oscillator stage. A 31-kHz signal is coupled to the Sync & Timing (Strip & Vert Drive) block and serves as a clock for the vertical counter. The H Pulse from the horizontal stages sets the time reference for the burst gating, which is generated in the Decoder (Lum Proc & Control) block. Horizontal Drive is generated within the horizontal stages and coupled to the Horizontal Deflection circuitry.

Horizontal & Vertical Deflection

These stages, as their names indicate, provide the horizontal and vertical scanning signals for the kinescope display. The respective drive signals from the Sync & Timing stages are amplified and shaped to provide current drive for the horizontal and vertical deflection yokes. Blanking signals are also generated and coupled to the kinescope grid.

Horizontal and vertical parabola signals are formed in the deflection stages and coupled to the Convergence, Pincushion, & Scan Failure block to serve as kinescope-display convergence corrections. The Vertical Parabola signal is also coupled to the Blanking & Kinescope Supply block to drive a Dynamic Focus stage.

Convergence, Pincushion, & Scan Failure

Circuitry included in this block provides dynamic convergence and correction signals to compensate for deflection distortions, and includes a stage to protect the kinescope against burning in the event of failure of the horizontal or vertical scanning circuitry.

Blanking & Kinescope Supply

This block includes the HV Oscillator and Blanking stages. Other stages within the block rectify the oscillator output for kinescope accelerating and focusing voltages.

VIDEO INPUT AMPLIFIER (Diagram 1)

Circuits on this diagram receive composite video signals, with minimum return loss, when used in a 75 Ω environment. Either of two input signals, coupled into VIDEO INPUT A and B connectors, can be displayed. Selection of input signal is made by a front-panel pushbutton. Circuitry is also included for video gain control and internal sync pickoff.

Video Input Connectors & Amplifiers

Composite video signals are picked off low return-loss feed-through coils. The input connectors are isolated from the chassis to aid in hum rejection. The cable shields are connected to the bases of the input transistors, Q1941 and Q1907. Any hum signal on the shield will be in phase with hum component on the composite video signal applied to the emitters. The hum signal is thus rejected differentially.

Transistors Q1843 and Q1807 are constant-current sources for the video input amplifiers. Q1811 is a stable voltage source for these transistors and provides temperature compensation.

Channel A Input Comp adjustment C1937 permits setting the yellow and cyan color bars to equal the 100 IRE white reference level. Channel B Input Comp adjustment C1909 is set to match the channel B signal to the channel A signal.

Channel Switching, Operational Amplifier, & Internal Sync

To facilitate remote switching, a ground-closure switching system is used. When the INPUT switch is set to A, CR1831 and Q1833 are turned on to feed the channel A signal from Q1941's collector through Q1833 to the operational amplifier, consisting of Q1829, Q1835, and Q1735. CR1931 and CR1817 are switching diodes. With the INPUT switch set to A, CR1931 is turned off and CR1817 is on. The channel B signal is thus effectively grounded through CR1915 and CR1817. With the INPUT switch set to B, CR1831 and Q1813 are turned on, CR1915 is off, and CR1831 is on, thus switching the signals fed to the operational amplifier.

The DC Offset adjustment (R1713) is set so that the color bar waveform black level voltage is equal to zero. CR1731 is a protection diode for Q1735.

Internal sync is taken from the collector of Q1735 and applied through Q1629 to Q1759 on the Sync & Timing diagram (3).

Gain Control

The composite video from Q1735's collector is applied to pin 3 of U1517, a monolithic transconductance amplifier. Pin 3 is referenced to pin 14, similar to the input connections of a differential amplifier.

Q1613 serves as a current source for pins 1 and 16 of U1517. R1619 and R1615 are fixed gain-setting resistors. Pin 12 is the variable-gain control input. The front-panel CONTRAST control sets the gain of U1517 when switched out of the detented PRESET position. The Min Gain Adj control (R1409) is set for a 40 mV waveform amplitude with the CONTRAST control set to minimum. The Contrast Preset adjustment (R7707) is set so that the amplitude from blanking to white reference is 200 mV at TP1313.

Q1529 is the current-limiting FET for U1517. Q1421, Q1407, and Q1311 comprise a current-gain amplifier for the composite video signal, which is applied to the Aperture Corrector. Gain of the stage is 3X.

APERTURE (Diagram 2)

This circuitry provides a variable amount of phase-linear mid-frequency boost in the luminance channel. This increase in mid-frequency response enhances picture sharpness.

Aperture Corrector

The composite video signal from the Video Input Amplifier (diagram 1) is coupled through grounded-base input stage Q128 to a 200 ns delay line (L126, L128, and associated capacitors). The delay line is made up of two T sections, unterminated at the output. The nature of this delay line, being unterminated, is such that the frequency response of the aperture corrector circuitry is broadly peaked at approximately 2.5 MHz.

The input and output signals of the delay line are coupled to pins 3 and 14 (respectively) of monolithic transconductance amplifier U135. Pins 3 and 14 function similarly to the input connections of a differential amplifier, in that only the difference signal is amplified. The difference between input and output signals of the delay line is basically the 2.5 MHz boost (due to its characteristics). Therefore, maximum boost (gain) through the circuit is centered around this frequency.

The unboosted output of the delay line is coupled through Q144 to the base of Q146. The amplified 2.5 MHz signal is also coupled directly from the output of U135 (pin 9) to the base of Q146. The output from Q146 is coupled to the luminance input amplifier on the NTSC or PAL Lum Proc & Control diagram 5 or 7.

U135, the Aperture Preset (R7710) adjustment, and the front-panel APERTURE control comprise the gain control portion of the aperture corrector circuitry. U135 functions as follows:

Pins 2 & 14 — Differential inputs.

Pins 8 & 9 — Output terminals (only pin 9 is used in this case).

Pin 11 — +Vcc.

Pin 5 — −Vcc (Q129, connected to pin 5, is a current-limiting FET).

Pin 13 — +9 V (Set by VR131).

Pin 12 — Variable gain control input terminal. The current through pin 12 controls the current through pin 5, thus controlling the gain of U135.

Pin 4 — Bias connection for input levels.

Pins 6, 7, & 10 — Grounded in this application.

Pins 1 & 2, 15 & 16 — Current input terminals. R135 and R134 are fixed gain-setting resistors. Q142 is a constant-current source.

Aperture Zero R148 is adjusted to approximate a flat response in the 0 MHz to 2.5 MHz portion of the luminance channel passband. This response can be obtained by applying a crosshatch convergence signal (from a Tektronix Test Signal Generator, or equivalent) to the picture monitor, connecting a probe from a test oscilloscope to TP2865 on diagram 5 or TP3860 on diagram 7, and setting the front-panel APERTURE control just out of the PRESET position. Then, R148 is adjusted to make the vertical crosshatch lines be the same amplitude as the horizontal crosshatch line as displayed on the oscilloscope.

Aperture Preset R7710 is adjusted when the front-panel APERTURE control is set to the PRESET (detent) position and the test oscilloscope probe is connected to TP2865 or TP3860. Then, R7710 is adjusted for approximately 120% pulse-to-bar ratio. This response produces approximately equal brightness of the vertical and horizontal crosshatch lines displayed on the picture monitor screen.

SYNC & TIMING
(Diagrams ◇3◇ and ◇4◇)

Circuitry on these diagrams phase locks the horizontal blanking interval to the incoming video sync, ensuring that sync will be displayed in the correct time relationship to the kinescope blanking, provides time shift of the vertical scan to display the input signal vertical blanking interval when the SCAN Vert Delay switch is set to vertical delay, and provides time shift of the horizontal scan to display the input signal horizontal blanking interval when the SCAN Horiz Delay switch is set to horizontal delay.

Phase correction is applied to the horizontal scan so that the center of the picture is straight. The effects of random jitter and periodic changes in sync timing can be displayed when they are present in the input signal applied to the monitor.

Inputs, Input Selector, Input & Chroma Filter

The sync input signal for synchronizing the monitor display may be derived internally or an external sync signal can be used. The SYNC and INPUT switches control the selection by a ground closure switching system. In general, A sync follows the channel A input; B sync always follows the B input.

To choose internal sync, the SYNC switch is set to INT. As a result, pin 1 of P1799 is grounded and Q1792 turns on. CR1761 turns on, CR1763 turns off, and the internal sync signal is coupled through Q1759 and CR1771 to the emitter of Q1681.

To select external sync, the SYNC switch is set to EXT. Pin 2 of P1799 is grounded, turning on Q1793. Diodes CR1861 and CR1883 are turned on. Further choice of external sync is made using the INPUT switch. Assume the INPUT switch is set to A. Then, Q1889 turns on, causing CR1887 to turn on.

Since CR1887 and CR1883 are on, CR1885 and CR1983 will be off. CR1779 turns on and the external sync signal from Q1991 passes through CR1779 to the emitter of Q1681.

Conversely, when channel B is chosen, Q1891, CR1865, CR1861, and CR1775 are on; CR1961 and CR1863 are off. The B external sync signal passes through Q1969 and CR1775 to the emitter of Q1681. Q1988 prevents loss of input amplifier bias during the interval when the INPUT switch is moved from A to B.

The external sync signal from each EXT SYNC connector is taken from their respective return loss coils. External sync A signal is applied to the emitter of Q1991; external sync B signal is applied to the emitter of Q1969.

The external sync input connectors are isolated from the chassis to reject unwanted mains signals that may be on the coax shields. The mains signal on the coax shield is in phase with the mains component of the sync signal on the center conductor, and is applied to the base of Q1991 or Q1969. This mains signal is then rejected by the differential characteristics of the transistor circuit.

Q1681 and Q1679 in the input & chroma filter circuit remove the chrominance component of the composite video signal. The signal is then applied to the emitter of Q1582 in the sync stripper circuit.

Sync Stripper

This circuit regenerates sync from the input signal. The composite sync output is sync negative 0 V to 5.5 V.

Q1571 is the dc restorer for the sync stripper circuit. The output of Q1571 and Q1679 drive Q1582, which is the amplifier input. Q1473 is a variable collector load for Q1582 and provides the agc for the circuit. Q1567 and Q1559 form a cascode amplifier. The signal at the emitter of Q1663 is dc restored and agc'd composite video.

Q1549, Q1643, and Q1659 are voltage comparators. The voltage at the emitter of Q1663 is compared to the dc levels set by the voltage divider consisting of R1547, R1645, R1653, and R1654. Sync is positive going at Q1663 emitter. The sync tip turns on Q1549 and the current is transferred to C1555. The voltage on C1555 is coupled through Q1556, Q1559, and Q1571 to provide dc restoration at the emitter of Q1663.

Q1643 and CR1647 process the sync at the 50% amplitude point between the sync tip and blanking levels, ensuring correct sync width. Q1659 and CR1651 use the difference in duty factor between the sync pulse width and blanking pulse width to determine the blanking level.

When Q1659 is turned on, its collector current charges C1557. Capacitor C1557 is continuously discharged by R1469. The charge on C1557 equals its discharge when Q1659 is switching at the back porch level. The voltage on C1557 determines the emitter impedance of Q1473 which controls the gain of Q1582. Thus, the gain is adjusted until the blanking level of the composite video signal equals the base voltage of Q1659.

Vertical Sync Recognition

The serrated vertical sync pulse is integrated by Q1443. The peak of the integrated signal turns on Q1347, providing one negative-going pulse per field to the vertical counter & delay circuit.

The vertical sync pulse is also connected to pin 3 of P1001 for application to the SECAM decoder board in the 673 Monitor. CR1345 and R1009 protect U1013 against random arcing conditions.

Vertical Counter & Delay

The purpose of this circuit is to provide a vertical drive pulse through pin 4 of P1001 to the deflection circuit for starting the vertical rate ramp and to provide the vertical blanking pulse.

Duration of the vertical drive pulse is approximately 500 μs. Timing of the pulse depends on the mode of operation set by the Vert Delay switch S7505. There are three different modes of operation which means that the starting time for the pulse is different for each mode as follows:

1. Normal Scan. This pulse starts at the end of the serrated vertical sync pulse.

2. Vertical Delay With Vertical Expand. This pulse is delayed to approximately 3/4 of a field for reasons of power conservation in the vertical deflection amplifier.

3. Vertical Delay Without Vertical Expand. This pulse is delayed one-half field.

Two signals are applied to the vertical counter. One is the negative-going vertical sync recognition pulse from Q1347 collector. This pulse is applied to pins 4 and 10 of the AND gates in U1013. The other is the 31-kHz signal applied to pin 14 of U1005. The vertical sync recognition pulse allows the vertical counter to be clocked by the 31-kHz signal. This clocking ensures proper interlace for all modes of operation. It also provides jitter-free delay during the vertical delay and pulse cross operating modes.

The following is a detailed description of the vertical counter and delay circuit.

Normal Scan Display. With the Vert Delay pushbutton switch set to Normal, pin 1 of P1001 is ungrounded so that pin 5 of U1105B is high. Pin 9 of U1013C is low. The negative-going pulse from Q1347 sets pin 10 of U1013C low and pin 4 of U1013B low.

The low on U1013B causes pin 11 of U1105D to go low. As a result, pins 2 and 3 of U1005 and U1101 go low. The reset pins 2 and 3 of U1005 and U1101 set all the Q outputs low. The low on pin 11 of U1105D presets pin 5 of U1127A high.

Now, U1005 counts from the 31-kHz pulses. The first high that arrives from pins 1 and 12 of U1005 through U1105B and U1227C to pin 3 of U1127A will cause pin 5 of U1127A to go low. This low causes pin 11 of U1013D to go high. producing a positive-going vertical drive output pulse.

The counters, U1005 and U1101, continue to count until pin 12 of U1101 goes high. This high causes pin 11 of U1105D to go high and pin 6 of U1013B goes low. The vertical drive pulse goes low, terminating the pulse.

Vertical Delay With Vertical Expand. For this mode of operation, the Vert Delay switch grounds pin 1 of P1001 and sets pin 5 of U1105B low. Assume pin 9 of U1013C is high. The vertical recognition pulse applied to pin 4 of U1013B causes pin 6 of U1013B to go high and pin 11 of U1105D to go low. Reset pins 2 and 3 of U1005 and U1101 go low and the count starts. The pulse that caused pin 11 of U1105D to go low presets pin 5 of U1127A high. The low on pin 10 of U1013C sets pin 6 of U1137B low.

At this time the counter counts from the 31-kHz pulses until pin 11 of U1101 goes high. This high sets pin 8 of U1137C low and pin 6 of U1137B high. The low on pin 8 resets U1005 and U1101 outputs low. These counters count until pin 11 of U1101 goes low again.

The low at pin 11 of U1101 sets pin 11 of U1137D high and pin 12 of U1227F goes low. This low is applied to the clear input (pin 1) of U1127A, causing pin 5 to go low. Pin 11 of U1013D goes high, starting the vertical drive pulse. Pin 6 of U1127A goes high at this time so that U1105C becomes active again.

Counters, U1005 and U1101, have gone through a complete cycle now and they start to count over again. The counters count from the 31-kHz pulses until pins 1 and 12 of U1101 go high. This high causes pin 11 of U1105D to go high. Pin 6 of U1013B goes low and the vertical drive pulse goes low, thus terminating the pulse.

Vertical Delay Without Vertical Expand. In this mode of operation, the Vert Delay switch grounds pin 1 of P1001, placing a low on pin 5 of U1105B.

A low is applied to pin 9 of U1013C and the vertical recognition pulse from Q1347 applies a low to pin 10 of U1013C. As a result, pin 8 of U1013C stays high. Pin 5 of U1127A is preset to high by U1013B and U1105D as before. The counters, U1005 and U1101, start to count. They count until pin 11 of U1101 goes low again.

Pin 6 of U1137B is high due to the first high on pin 11 of U1101. Then, the low on pin 13 of U1137D causes pin 12 of U1227F to go low, clearing pin 5 of U1127A low. Pin 11 of U1013D goes high, starting the vertical drive pulse.

At this time, U1005 and U1101 have gone through a complete cycle and start to count again. They count from the 31-kHz pulses until pins 1 and 12 of U1101 go high. This high causes pin 11 of U1105D to go high and pin 6 of U1013B goes low, terminating the vertical drive pulse.

31-kHz Lockout, Truncated Ramp, and Sample & Hold

Composite sync drives Q1355 and Q1271. These transistors are used in a Bowes oscillator circuit that runs at 15 kHz and is triggered by the negative-going edge of the sync pulse. The half-cycle transition occurs just before the 50% point in time.

Q1465 stops the oscillator 4.5 μs before the next sync pulse. Q1465 then allows a sync pulse to pass by Q1459, triggering the Bowes oscillator through CR1365. When the oscillator starts, Q1471 turns off, allowing a sample of the truncated ramp to be taken by Q1379.

The operation of Q1459, Q1465, and Q1471 prevents false samples from being taken when a sync pulse is missing.

In addition, these transistors keep the vertical interval 2H-rate sync pulses and many noise pulses from triggering the oscillator.

The current at the output of the oscillator is converted to an up-down trancated ramp at the collector of Q1375. The rise and fall times of the ramp are approximately 13 μs each. The voltage on the ramp is sampled by a pulse derived from blanking. This sample is driven by U1049A and Q1281 delaying circuitry. A 0.5-μs sample, generated by Q1483, turns on Q1379 in the middle of the negative-going ramp. The voltage at that point is transferred to C1383.

Any difference in time between incoming sync and blanking will change the voltage on C1383, and the sample pulse moves up or down the ramp. The voltage on C1383 is applied to Q1389 and Q1387, a voltage follower.

Oscillator Voltage Control and 2H-Rate VCO

The output of the voltage follower, Q1389 and Q1387, is applied to an error amplifier, U1397, whose bandwidth is determined by its feedback elements (C1295, C1297, and R1298) and input resistors, R1395 and R1398. Resistor R1395 can be shorted by Q1497 to provide wide bandwidth for fast afc operation.

The output of the error amplifier controls the frequency of the 2H-rate vco, Q1189 and Q1181, by affecting the voltage swing at the collector of Q1189. The main frequency-determining components of the vco are C1185, R1186, R1187, R1193, R1195, and R1197. The 31-kHz signal at the collector of Q1181 drives the horizontal deflection output circuit via the phase correction and horizontal drive circuitry. If the blanking signal is incorrectly timed to incoming sync, an error signal is generated to correct the phase of the vco and provide correct timing.

Lockup Detector and Fast AFC Switch

The afc circuit has a fast and slow mode of operation. In the fast mode this circuit has a wide pull-in range and locks up quickly. It then automatically switches to the slow mode. The slow mode of operation readily displays sync timing errors in the 60-Hz to 240-Hz frequency range; for example, servo errors of the video tape recorder.

If slow mode of operation is not needed, jumper P1699 can be used to keep the circuit operating in the fast mode to correct for most sync timing errors and stabilize the picture.

During lockup, Q1486 randomly samples the truncated ramp. Its average output is a positive voltage that is filtered by C1595 and R1597. This voltage is applied to U1697, driving the output of U1697 negative and turning on Q1497. Transistor Q1497 shorts R1395, thus switching the afc into the fast mode.

After lockup has been achieved, Q1486 samples only the most negative portion of the truncated ramp because of the one-fourth line delay provided by Q1593. The averaged signal applied to pin 2 of U1697 is only a few tenths of a volt positive, but it is more negative than the voltage at pin 3 of U1697. As a result, the output of U1697 switches positive and turns off Q1497. This makes R1395 the input resistor to the error amplifier, thus switching the afc loop to the slow mode.

Since the output of Q1486 can never reach 0 V, the afc circuit can be kept in the fast mode by grounding pin 3 of U1697. Jumper P1699 is provided for this purpose.

Phase Correction

This circuit corrects for drive-dependent delay in the horizontal deflection circuitry so that the picture is straight vertically.

U1049A and C are connected as an RS flip-flop. The leading edge of the horizontal blanking pulse sets the output high. The negative-going edge of the vco output resets the output low. U1049C gates an up-down integrator whose output is the collector of Q1369.

The average level of the signal at the collector of Q1369 is converted to a current by resistors R1267 and R1163 in a 1-kHz filter. C1167 charge time is governed by this current. When the output of the vco goes negative, Q1171 turns off and remains off until C1167 recharges and turns on Q1171. As Q1171 turns on again, the transition is applied through U1227D to pin 11 of U1127B, the horizontal drive divide-by-two flip-flop.

The phase correction circuit has now measured the timing difference between the leading edge of the horizontal blanking pulse and the negative-going edge of the vco output, regulating the difference to 5 μs. Thus, the stability of the vco is transferred to the blanking pulse.

Sample Pulse Delay & Horizontal Delay Control

The luminance filter on the decoder board adds delay to the video information. Therefore, the sync and timing signals must also be changed proportionally about 700 ns to keep the picture framed. Q1281 delays the sampling pulse generator Q1483. Q1281 is driven by Q1155 and U1049D or Q1047 and U1049B in Normal and Horiz Delayed scan modes respectively.

To display the horizontal blanking interval, the Horiz Delay pushbutton switch grounds pin 1 of P1051 to set the inputs of either U1049B or D low. The signals at the output of U1049B and D are used to phase lock the Bowes oscillator to incoming sync.

Q1239 is a 1 μs single-shot that is triggered by the leading edge of the blanking pulse. The leading edge of the pulse at the collector of Q1239 drives pin 10 of U1049C and the trailing edge drives a 5 μs single-shot Q1251. The collector of Q1251 provides a black reference level sample pulse to the output amplifier circuit.

Q1179 is activated by depressing the Horiz Delay pushbutton switch. The horizontal blanking gate from pin 1 of U1049A drives the base of Q1179 and the negative-going output pulse produced at the collector is used to clamp the chrominance channel in the decoder during the kinescope blanking interval. Clamping at this time provides 0 V output so that the black reference clamp in the output amplifier can operate.

U1137A is an inverter that turns on U1049B when U1049D is off during horizontal delay of scan mode of operation.

Horiz Drive Circuit. U1127B is a divide-by-two flip-flop that converts the 31-kHz square-wave input signal at pin 11 to a 15-kHz horizontal drive output signal at pin 9. A phasing signal from the HV phasing circuit is applied to the clear input (pin 13 of U1127D) to assure that the horizontal drive output signal phase is correct with respect to the high-voltage oscillator. The output signal at pin 9 of U1127B is applied to the following circuits:

1. High-voltage phasing circuit (Q1015 and Q1111). The diagram for this circuit is located on the back side of diagram 3.

2. Horizontal output circuit on diagram 12. This circuit drives the horizontal output transformer which, in turn, drives the horizontal deflection output transistor.

High Voltage Phasing Circuit. The 15-kHz horizontal drive signal at pin 9 of U1127B is applied to the base of Q1015. A 15-kHz sine wave from Q6477 (diagram 14) is applied to C6575 in series with R6675, R1013, CR1033, and C1017. C6575 charges C1017 on the positive-going slope of the 15-kHz sine wave if Q1015 is off during this time. C1017 will charge to approximately 30 volts and trigger CR1125 into conduction. CR1125 discharges C1017. The pulse at the junction of R1125 and R1109 is inverted by Q1111. This clear pulse reverses the phase of U1127B, pin 9, with respect to the 15-kHz high-voltage sine wave. At this time Q1015 is on during the positive-going slope of the 15-kHz high-voltage sine wave, preventing C1017 from charging positively. This is the desired phase of the high voltage oscillator with respect to the horizontal drive signal.

The charging and discharging of C1017 may be observed if Q1015 is removed. An unstable horizontal display will result as the afc returns the horziontal drive to proper phase with respect to composite sync. Normally the correction pulse to the clear input of U1127B will only occur if the input signal to the monitor is interrupted or upon turning on the monitor. Proper operation is assured by correct tuning of the high-voltage oscillator. This is accomplished by selecting a capacitor to connect in parallel with C6573 or C6473 as described in the Maintenance section under High-Voltage Oscillator Tuning.

NTSC COLOR DECODER (Diagrams ◇5◇ and ◇6◇)

Circuitry on these diagrams serves to reduce color-encoded signals to basic color voltages (red, green, and blue, or RGB) for the kinescope display.

Input Signal

The composite video signal from the aperture corrector circuit is divided into two parts; part of the signal current is coupled to the luminance processing circuits, the other part is used to drive chrominance processing circuitry. Current is divided by grounded-base input stages, Q2485 and Q128 (located in the Variable Aperture Corrector circuit, diagram 2).

Luminance Input Amplifier

The luminance signal is delayed for 700 ns, overall, to compensate for the delays in chrominance processing. The aperture correction circuit provides a 200 ns delay, and a delay line in the luminance input amplifier provides a 500 ns delay. The delay line is made up of five T sections, source-terminated by R2579. L2677 and R2679 are dribble-up compensation; C2585 and L2581 are the chroma trap. L2581 is adjusted for minimum chrominance on luminance at TP2865. R2885 is the output termination for the delay line.

The jumper on P2577 (Bandpass) in the wide bandpass position (pins 2 and 3 jumpered) allows the delay line to be bypassed so that full bandwidth signals can be applied through the luminance channel to the output amplifier. This position of the jumper is useful for checking circuit operation when troubleshooting.

Q2785, Q2799, and Q2875 form an operational amplifier that provides a low source impedance for terminating the delay line. Lum Gain (R2977) adjustment is set so that the luminance amplitude at TP2865 is 2 V from video black level to the 100 IRE white level.

Luminance Feedback and Output Amplifier Clamps

The luminance feedback clamp circuit, Q2861 and U2861, serves to maintain luminance at a level directly proportional to the level set by the BRIGHTNESS control circuit. The output amplifier clamp, Q2863, provides a ground reference for the output amplifier during the horizontal blanking interval.

During burst, a 15 V positive-going pulse is applied to the gate of Q2861. The FET turns on and samples the output of the luminance amplifier at TP2865. This sampled voltage is applied to pin 2 of U2861 and compared with the voltage applied to pin 3 from the BRIGHTNESS control circuit. Any difference voltage between pins 2 and 3 of U2861 is applied to the input of the luminance amplifier, causing the output to move to a level that will make the difference voltage zero. C2759 retains the sampled voltage level until the next sample is taken.

Q2863 is gated on during the horizontal blanking interval. As a result, the luminance level at the collector of Q2863 is driven to ground at this time to provide a black reference sample pulse to the output amplifier.

H-Rate Sync

This circuit eliminates the 2H-rate vertical interval information and sound-in-sync encoding to provide regenerated H-rate sync pulses. These pulses are applied to various gate and clamp circuits in the decoder.

Q2083 accepts positive-going 2.5 μs horizontal blanking pulses from P1399-2 on the Sync & Timing board. Q2183 accepts negative-going composite sync from P1301-4 on the same board. These pulses are used to gate on U2181, an RS flip-flop. The purpose of the flip-flop is to eliminate the 2H-rate pulses from the composite sync signal so that only H-rate pulses are obtained at the output (pin 8) of U2181.

U2181 is held on, until almost to the trailing edge of sync, by the one-shot action of Q2289. Then, the trailing edge of sync resets the flip-flop. The negative-going pulse from pin 8 of U2181 turns off CR2283 and Q2375. A positive-going gate, having a delay of 0.5 μs, is generated at the collector of Q2375 during sync time. This gate is used to dc-restore the R-Y, G-Y and B-Y amplifiers.

Burst Gate Generator

Q2269 and Q2351 is the burst gate generator for driving the luminance feedback clamp and the burst gate amplifier. Q2269 is normally on, and Q2351 is normally off. The end of the H-rate sync pulse turns off Q2269, producing a negative-going pulse at its collector. This pulse becomes a ramp (by means of C2265) that allows Q2351 to turn on, and a positive-going delayed pulse, occurring during back porch (burst) time, is produced at the collector. A negative-going pulse is developed at the emitter of Q2351.

The positive-going pulse from the collector of Q2351 is used to drive Q2861 in the luminance feedback circuit. The negative-going pulse from the emitter of Q2351 is applied to the emitter of Q2253, the input to the burst gate amplifier.

Burst Gate Amplifier

Q2253, Q2251, Q2257, Q2155, and Q2141 form the burst gate amplifier circuit. This circuit applies a positive-going 15 V gate to Q2233 and Q2135 in the phase control circuit when burst is present and is the correct phase.

The normal conditions for the transistors in this circuit are as follows: Q2253 is on; Q2251, Q2155, and Q2141 are off; Q2257 is an emitter follower. Q2253 and CR2325 form an AND gate that requires two simultaneous 'low' input signals to obtain a 'low' at the output for turning on Q2251. One of the 'low' input signals is obtained by applying a negative-going back porch pulse from the emitter of Q2351 to the emitter of Q2253. The other 'low' input is the negative-going B-Y burst signal from the B-Y signal amplifier stage. These pulses turn on Q2251 to provide a burst-tip clamp signal.

A negative-going pulse occurs at the collector of Q2251, and is applied through Q2257 to Q2155. Transistors Q2155 and Q2141 turn on to apply a positive-going 15 V burst gate pulse to Q2233 and Q2135 in the phase control circuit.

Phase Control

The phase control circuit provides an error voltage, if present, to the subcarrier oscillator. Then, the oscillator changes frequency and phase in a direction that eliminates the error. Other functions of the phase control circuit are: to provide a turn-on voltage to the burst present detector stage when burst is present, and allows the HUE control to change the phase of the subcarrier oscillator and thus alter the hue of the display.

If burst is present and is the correct phase, the burst gate amplifier supplies a positive-going 15 V gate that turns on Q2233 and Q2135. These FET transistors sample the B-Y and R-Y signals at this time, and the sampled voltages charge holding capacitors C2225 and C2133.

The sampled R-Y signal, which may be positive or negative, is compared with the setting of the HUE control at the input (pins 2 and 3) of U2125. If there is a difference, an error voltage will be present at the output (pin 6) of U2125. This voltage controls the dc bias applied to the varactor diode, CR2009, in the subcarrier oscillator circuit. CR2009 changes the oscillator frequency and phase in a direction that makes U2125 pin 3 voltage equal to pin 2.

The Error Amp DC Balance adjustment (R2025) supplies an offset current to compensate for circuit imbalances. This control is adjusted for proper color bar decoding at the red output TP6215 on the Kinescope Socket board when the CONTRAST control is set to its minimum position.

The B-Y sampled voltage from Q2135 has a negative polarity and is applied to an emitter follower, U2051. The negative polarity voltage from the output of U2051 is applied to one side of the HUE control. The other side of the HUE control receives a positive voltage from the inverter, U2027. Thus, the HUE control can be varied from one polarity to the other, or set at 0 V.

If burst is present, the negative voltage output from U2051 is used as a turn-on voltage for the burst present detector stage.

Burst Present Detector

U2053 is a positive-feedback amplifier that acts like a Schmitt level detector. If burst is present and is the correct phase, the output of U2053 is −15 V. If burst is not the correct phase, or is not present, the output of U2053 is +15 V.

Chroma Zero Reference Clamp

The error, caused by residual subcarrier on the video signal applied to the monitor, can be displayed as a color shift. It is displayed by using jumper P2097 to connect the standardized horizontal sync pulses to Q2177, which turns on Q2453 and Q2451 in the chroma input amplifier to provide a real zero reference point at the inputs to the demodulators during sync time.

The chroma zero reference clamp circuit has four other major functions:

1. In AUTO mode, this circuit unclamps during back porch time so that burst, if present, turns on the chroma channel for color operation. If burst is absent, the clamp circuit turns off the chroma channel.

2. In COLOR mode, the clamp circuit unclamps to turn on the chroma channel all the time, whether burst is present or not.

3. In B&W mode, the clamp circuit turns off the chroma channel to produce a monochrome display.

4. In horizontal delay of SCAN mode, the clamp circuit turns off the chroma channel during the kinescope blanking interval so that the auto black level circuitry in the output amplifier can operate.

Table 7-1 is a circuit description of the chroma zero reference clamp circuit arranged in chart form.

Table 7-1
CHROMA ZERO REFERENCE CLAMP CIRCUIT

Chroma Zero Reference Jumper P2097	Mode	Burst[a]	Q2085	Q2087	Q2177	Chroma Zero Reference Clamp to Q2453 & Q2451[b]
Set to INT. (Negative-going horizontal sync pulse is applied from pin 8 of U2181 through CR2093 and P2097 jumper to Q2177.)	AUTO	Present	Turned off by U2053.	Turned off by B&W switch	Turned on during horizontal sync time by pulse from U2181.	Clamps during horizontal sync time.[c]
		Absent	Turned on by U2053. Turned off during sync and back porch by U2181 & Q2269.	Turned off by B&W switch.	Turned on all the time except during back porch. Controlled by Q2085 and sync pulse from U2181.	Clamps all the time except during back porch.[c]
	COLOR	Either	Turned off by COLOR switch.	Turned off by B&W switch.	Turned on during horizontal sync time by pulse from U2181.	Clamps during horizontal sync time.[c]
	B&W	Either	Controlled by U2053 & Q2269 but does not affect Q2087 & Q2177.	Turned on by B&W switch.	Q2087 turns on Q2177 all the time.	Clamps all the time.
Set to EXT. (Negative-going horizontal sync pulse from pin 8 of U2181 is applied through CR2093 & P2097 jumper to Q2085 base. Q2085 inverts pulse and applies it to Q2177 in AUTO, burst-absent, mode.)	AUTO	Present	Turned off by U2053.	Turned off by B&W switch.	Turned off all the time by U2053.	Unclamps all the time.
		Absent	Turned on by U2053. Turned off during sync and back porch by U2181 & Q2269	Turned off by B&W switch.	Turned on all the time except during sync and back porch. Controlled by Q2085.	Clamps all the time except during sync and back porch.
	COLOR	Either	Turned off by COLOR switch.	Turned off by B&W switch.	Turned off all the time by COLOR switch.	Unclamps all the time.
	B&W	Either	Controlled by U2053 & Q2269 but does not affect Q2087 & Q2177.	Turned on by B&W switch.	Q2087 turns on Q2177 all the time.	Clamps all the time.
Horizontal delay of SCAN mode with P2097 set to INT or EXT.	Any	Either	The negative-going pulse at P2099-3 turns on Q2087 and Q2177 during kinescope blanking time; it overrides the above conditions.			Clamps during kinescope blanking time.

[a]Definition of burst absent: No burst or burst is out of phase.

[b]When Q2177 is on, Q2453 and Q2451 turn on and clamp the inputs to the demodulators to ground; thus, turning off the chrominance component during this time.

[c]Clamping to ground during horizontal sync time in the AUTO and COLOR modes provides absolute zero chroma reference for displaying residual subcarrier.

Subcarrier Oscillator

The subcarrier oscillator, Q2111 and Q2105, is a varactor-diode-controlled, crystal oscillator that can be varied about 200 Hz either side of 3.58 MHz. L2203, C2109, and C2113 are a low-pass filter for the 3.58 MHz signal.

Demodulators

The demodulators, U2425 and U2405, are differential devices, single-end driven, with the other input biased to a dc level. The demodulators require input chrominance and regenerated subcarrier to operate.

The regenerated subcarrier differentially drives the demodulators through R2415 and R2401. B-Y Phase, L2205, together with C2301 and R2309, form the quadrature phase shift network. U2405 is driven 90° out of phase from U2425. The output from the demodulators is applied to chroma response filters that limit the bandwidth to approximately 650 kHz.

The G-Y Phase control, R2407, is adjusted for proper color decoding when an oscilloscope is connected to TP6219 on the Output Amplifiers board. The signal black level of the color bars should be parallel to the video signal blanking level.

Chroma Input Amplifier

The purpose of the chroma input amplifier is to allow only the chrominance component of the composite video signal to pass through the amplifier. Amplitude of the chrominance signal can be varied by the CHROMA control circuit and turned on or off by a clamping stage driven by the chroma zero reference clamp circuit.

Q2485 is a grounded-base input stage for the composite video signal. C2481 and L2655 form a series resonant circuit with a center frequency of 3.58 MHz. Bandwidth is determined by R2483. A gain cell, CR2475 and CR2477, drives the operational amplifier, Q2467, Q2459, and Q2367. Gain of the cell is determined by the dc durrent split between the series and shunt diodes.

The Chroma Preset R7803 and CHROMA controls set the ratio of the dc currents in the gain cell which, in turn, set the ratio of the ac signal currents. The ac and dc current ratios are equal. The input to the demodulators is clamped to ground by Q2453 and Q2451 when no chrominance is desired.

R-Y, G-Y, and B-Y Signal Amplifiers

The R-Y and B-Y signals from the demodulators drive the R-Y, G-Y, and B-Y operational amplifiers. The R-Y and B-Y signals are amplified by non-inverting, feedback-stabilized, voltage amplifiers. The input voltage signals are developed across the filter terminating resistors, R2537 and R2527. The R-Y gain is set by the ratio of the demodulator gain resistor, R2427, to the filter terminating resistor (R2537), the amplifier gain determining resistors (R2553 and R2657), and the Chroma Preset adjustment with R2465.

The G-Y signal is formed by the sum of the R-Y and B-Y currents through the filter terminating resistors, R2537 and R2527. The signal is amplified and inverted by the operational amplifier to provide the G-Y output voltage. Gain is set by the ratio of the demodulator gain resistors, R2427, R2409, and R2407, to the G-Y operational amplifier feedback resistor, R2627.

The dc voltage at the outputs of the operational amplifiers is controlled by the sampled feedback clamps. Sampling occurs during horizontal sync time. The stabilizing feedback loops are interdependent.

RGB Matrix

The gain and level set signals, R-Y, G-Y, and B-Y, from the operation amplifiers are resistively added to the luminance, Y, that was delayed to allow for the chroma processing. The resultant signals are decoded color currents (RGB) that drive the output amplifiers.

NTSC TEST Pushbutton

With the NTSC TEST pushbutton switch set to the out position, the RGB matrix circuit is modified to largely compensate for limitations in available color phosphors. When the pushbutton is pressed in, the RGB matrix reverts to strict NTSC values to allow test and setup to be performed using a standard NTSC color bar signal.

Insertion of the chroma correction matrix is controlled by transistor Q2605. With the NTSC TEST pushbutton set to the out position as shown on diagram 6, Q2605 is turned on. This transistor turns on FETs Q2925, Q2919, and Q2915 to connect the chroma correction matrix resistors to the NTSC decoder RGB matrix circuit. Using R-Y as an example, the correction resistors are R2905 and R2803.

If the NTSC TEST pushbutton is pushed in, Q2605 turns off. The FETs turn off and the chroma correction matrix resistors are disconnected from the RGB matrix circuit.

The demodulated chroma outputs to P6258-1, -3, and -5 on the Option 2 circuit board (see diagram 16) are picked off ahead of the chroma correction matrix resistors. These signals are not affected by the switching in or out of the correction resistors.

PAL COLOR DECODER (Diagrams ◇7◇ , ◇8◇ , & ◇9◇)

Purpose

The PAL Decoder serves to reduce color-encoded signals to basic color drive voltages for the kinescope display.

Luminance Processing

Half of the signal current from the video input amplifier flows in the luminance processing circuit while the other half is used in chrominance processing. Current is divided by the grounded base input stages. These stages are Q3790 in the luminance processing circuit and Q3694 in the chroma input amplifier circuit.

The luminance signal is delayed to compensate for the circuit delays in chrominance processing. The delay line used for this purpose consists of two T sections with a chroma trap (L3790 and C3796) to remove the unwanted chrominance information. L3790 is adjusted for minimum chrominance on luminance at TP3960. The output of the delay line is terminated by R3990, and the Q of the chroma trap is determined by R3790.

The jumper on P3790 in the wide bandpass position allows the delay line to be bypassed so that full bandwidth signals can be applied through the luminance channel to the output amplifier. This position of the jumper is useful for checking circuit operation when troubleshooting.

An operational amplifier, Q3984, Q3980, and Q3864, provides the low impedance required to terminate the delay line. Dc restoration is provided by Q3866 and U3957. The back porch voltage level at the output of the luminance amplifier is switched by Q3866 to U3957. U3957 operates as an integrator. As long as the back porch level is not zero, the integrator output moves to reduce the back porch level to 0 V at the luminance amplifier output; thus, completing the feedback loop. The Luminance Gain control R3880 is adjusted so that the luminance amplitude at TP3960 is 2 volts from setup level to the 100% white reference level.

Circuit time constants in the operational amplifier are slow enough to display about 70% of any mains frequency hum present. If the back porch clamp signal is lost, Q3866 turns on and forces the average output level of the luminance amplifier to 0 V via the feedback loop.

The reference for U3957 is set by the front-panel BRIGHTNESS control so that the dc level of the signal at TP3960 can be varied. Q3862 is a clamp during the horizontal blanking interval for the luminance signal so that, during clamping time, the auto dc level controls of the output amplifier can operate.

Sync Processing and Chroma Clamp Driver

These circuits convert composite sync into standardized horizontal rate sync pulses. Noise in the pulses and 2H-rate vertical information are eliminated. The H-rate sync pulses provide clamp drive for the decoded signals in the chroma processing circuit. They are also applied to the back porch gate generator and chroma zero reference clamp driver circuit.

U3180B and C, an RS flip-flop, is gated on by ANDing composite sync and regenerated H pulses in U3180A. The flip-flop is held on, until almost the trailing edge of sync, by the one-shot action of Q3270. The trailing edge of sync resets the flip-flop.

The negative-going pulse from pin 8 of U3180B turns off CR3368 and Q3368. A positive-going gate, having a delay of 0.5 μs, is generated at the collector of Q3368 during sync time. This gate is used to dc restore the decoded signals in the chroma processing circuit.

Back Porch Gate Generator

Q3074 and Q3446 are the back porch gate generator. These transistors drive the luminance back porch clamp and the burst gate/amp circuits.

Burst Gate/Amp

This circuit provides a 0.5 V positive-going pedestal to the peak detector stage if burst is absent. If burst is present, a negative-going 1.5 V pulse is produced.

Q3444 is normally on and Q3440 is off. Demodulated U (B-Y) signal is applied through CR3442 and R3440 to the emitter of Q3440. At burst time Q3444 is turned off. Q3440 becomes a grounded-base amplifier, gating a positive burst pulse of about 2 V through Q3434, an emitter follower, to the peak detector. Q3440 amplifies only positive pulses, clipping above 7 V. Negative pulses are clipped. A pedestal of about 0.5 V is applied to the detector if burst is not present.

Peak Detectors

The output pulse from the burst gate/amp is applied to the bases of Q3233 and Q3236. These transistors are fast, low-collector-voltage-rated devices that are operated in cascode with Q3342 and Q3340.

When the peak detectors are alternately gated on by the line rate flip-flop, they conduct on about the top 40% of the burst gate pulse, even when the burst pulse amplitude varies between about 0.5 V and 7 V as the CHROMA control is varied. The output of Q3342 and Q3340 is a positive pulse of about 20 V.

Phase Control

The phase control circuit provides an error voltage, if present, to the subcarrier oscillator. Then, the oscillator changes its frequency and phase in a direction that eliminates the error. The phase control circuit also provides a turn-on voltage to the burst detector stage when burst is present.

When the peak detectors operate at burst time, the phase control sampling gates, Q3146 and Q3150, are alternately opened, gating through demodulated Alt V burst pulse voltage. The gated voltages charge holding capacitor C3042 at the minus amplifier U3040A and the plus amplifier U3040B are compared at the minus input of the error amplifier U3030A. If the voltages cancel, no error correction voltage is generated.

The presence of a voltage at the input to U3030A indicates a phase error, and the output changes to provide the correct polarity voltage to the subcarrier oscillator varactor diode, changing the oscillator frequency until no error voltage is present at the output of the error amplifier.

The Error Amp DC Bal Adjustment, R3030, is provided to supply an offset current to compensate for circuit imbalances. This control is adjusted to overlay the color bar levels at the V (R-Y) output TP3740.

Burst Present Detector

The output of the plus phase control amplifier (normally about 350 mV) is applied to the minus input of the burst present Schmitt, U3050B. If the burst signal is present, the output of U3050B is negative. The Schmitt switches states at about 50 mV (off) and 100 mV (on) with the output going positive when the burst signal is missing.

Chroma Zero Reference Clamp Driver

The error, caused by residual subcarrier on the video signal applied to the monitor, can be displayed as a color shift. It is displayed by using jumper P3090 to connect the standardized horizontal sync pulses to Q3072, which turns on Q3674 and Q3868 in the chroma input amplifier circuit to provide a real zero reference point for the demodulators during sync time.

The chroma zero reference clamp driver circuit has four other major functions:

1. in AUTO mode, this circuit unclamps during back porch time so that burst, if present, turns on the chroma channel for color operation. If burst is absent, the clamp circuit turns off the chroma channel.

2. In COLOR mode, the clamp circuit unclamps to turn on the chroma channel all the time, whether burst is present or not.

3. In B&W mode, the clamp circuit turns off the chroma channel to produce a monochrome display.

4. In horizontal delay of SCAN mode, the clamp circuit turns off the chroma channel during the kinescope blanking interval so that the auto black level circuitry in the output amplifier can operate.

Table 7-2 is a circuit description of the chroma zero reference clamp driver circuit arranged in chart form.

Table 7-2

CHROMA ZERO REFERENCE CLAMP DRIVER CIRCUIT

Chroma Zero Reference Jumper P3090	MODE	Burst[a]	Q3090	Q3092	Q3072	Chroma Zero Reference Clamp to Q3674 & Q3868[b]
Set to INT. (Negative-going horizontal sync pulse is applied from pin 8 of U3180B through CR3096 and Q3072.)	AUTO	Present	Turned off by U3050B.	Turned off by B&W switch.	Turned on during horizontal sync time by U3180B.	Clamps during horizontal sync time.[c]
		Absent	Turned on by U3050B. Turned off during sync and U3080B & Q3074.	Turned off by B&W switch.	Turned on all the time except during back porch. Controlled by Q3090 and sync pulse from U3180B.	Clamps all the time escept during back porch.[c]
	COLOR	Either	Turned off by COLOR switch.	Turned off by B&W switch.	Turned on during horizontal sync time by pulse from U3180B.	Clamps during horizontal sync time.[c]
	B&W	Either	Controlled by U3050B & Q3074 but does not affect Q3092 & Q3072.	Turned on by B&W switch.	Q3092 turns on Q3072 all the time.	Clamps all the time.
Set to EXT. (Negative-going horizontal sync pulse from pin 8 of U3180B is applied through CR3096 and P3090 jumper to Q3090 base. Q3090 inverts the pulse and applies it to Q3072 in AUTO, burst-absent, mode.	AUTO	Present	Turned off by U3050B.	Turned off by B&W switch.	Turned off all the time by U3050B.	Unclamps all the time.
		Absent	Turned on by U3050B. Turned off during sync and back porch by U3180B & Q3074.	Turned off by B&W switch.	Turned on all the time except during sync and back porch. Controlled by Q3090.	Clamps all the time except during sync and back porch.
	COLOR	Either	Turned off by COLOR switch.	Turned off by B&W switch.	Turned off all the time by COLOR switch.	Unclamps all the time.
	B&W	Either	Controlled by U3050B & Q3074 but does not affect Q3092 & Q3072.	Turned on by B&W switch.	Q3092 turns on Q3072 all the time	Clamps all the time.
Horizontal delay of SCAN mode with P3090 set to INT or EXT.	Any	Either	The negative-going pulse at P1051-10 turns on Q3092 and Q3072 during kinescope blanking time; it overrides the above conditions.			Clamps during kinescope blanking time.

[a]Definition of burst absent: No burst or burst is out of phase.

[b]When Q3072 is on, Q3674 and Q3868 turn on and clamp the inputs to the demodulators to ground; thus, turning off the chrominance component during this time.

[c]Clamping to ground during horizontal sync time in the AUTO and COLOR modes provides absolute zero chroma reference for displaying residual subcarrier.

Delay Line Control

In DELUXE mode of operation, the demodulated V (R-Y) signal is applied to the delay-line sampling gates, Q3344 and Q3350. If the amplitudes of the R-Y components of the bursts on alternate lines are not equal, due to incorrect delay-line phase, the dc voltages applied to the inputs of U3156B are not equal. A delay correction voltage is then applied to the gain cells in the one-line chroma delay circuit.

The amplitudes of the demodulated V and the demodulated Alt V signals are compared in U3050A. If the amplitudes are not equal, a gain correction signal is sent to the one-line chroma delay circuit. Samples are taken, compared, and correction signals are generated until the phase and gain errors are corrected. This is the automatic compensation for temperature and time dependent drift in the glass delay line (DL3480).

The Low Amp Delay Line Phase control R3054 is adjusted for minimum dc level change of the waveform at TP3390 as the CHROMA control is varied from 0.5X to 3X. Similarly, the Low Amp Delay Line Gain control R3052 is adjusted for minimum dc level change of the waveform at TP3290 as the CHROMA control is varied.

Line Rate Flip-Flop

The regenerated H pulse from the sync and timing circuit is applied to Q3142, amplified, and inverted to provide the line rate flip-flop clock pulse. The flip- flop U3130 toggles on each clock pulse, providing alternate plus and minus output pulses to drive the PAL 180° switcher, peak detector, delay line gain control sampling gates, and the phase control sampling gates.

Flip-Flop Correction

If the output of U3040A goes positive, due to incorrect phase of the line rate flip-flop, the output of U3030B, a Schmitt, goes positive and charges C3040. When the charge reaches 5 V, the PUT (programmable unijunction transistor), Q3140, fires and turns on Q3142, generating a clock pulse. The clock pulse toggles the flip-flop, changing its state between the regular clock pulses, and the output of U3040A goes back to its normal negative state. If the correction is not made for some reason, the capacitor will again charge and fire the PUT in about 20 ms.

One-Line Chroma Delay

In DELUXE mode of operation, a signal of one-half amplitude from the center of T3446 primary windings is sent through the one-line chroma delay circuit. R3570 provides a low-impedance source termination for the delay line, DL3480. Compensation for the input and output capacitance of the delay line transducer is provided by the transducer peaking coils, L3480 and L3380. Some of the signal is directly coupled around the delay line. This non-delayed signal is normalized by the Delay Line Quad Phase adjustment, C3480, and then canceled by the negative direct signal provided by the inductive coupling of the transducer peaking coils.

The delay line is terminated by the effective impedance (200 Ω resistive) of the paralleled, series RC networks. The total impedance of each parallel branch is equal to the other, making the current at the output of the networks equal.

The output of the RC networks is applied to complementary gain cells. When a phase adjustment is made, one gain cell is turned on, and the other off. The phase shift in the R3380-C3382 network is about 5°, with about 60° in the other network, making the correction range from +5° to +60°, dependent on the gain cell current split. The phase advance is needed to make up for the phase delay in the post-delay line operational amplifier. The gain of the gain cells is adjusted in parallel to compensate for changing losses in the delay line, and to finely adjust the gain cells for the total circuit gain.

The post-delay operational amplifier, Q3482, Q3582, and Q3584, provides the low input impedance the gain cells require and the low output impedance to drive the center tap of the PAL simple-deluxe switching transformer. The half-amplitude direct signal through the one line delay is added to the half-amplitude direct signal. In one half of the transformer secondary the R-Y components of the signals cancel and the B-Y add to provide a full amplitude signal to U3510, the B-Y demodulator. In the other half of the secondary, the delayed signal is subtracted from the direct signal. The B-Y components cancel and the alternating R-Y components add, and a full amplitude signal is applied to U3526, the R-Y demodulator.

Chroma Input Amplifier

The chroma input amplifier has two shunt clamps, Q3674 and Q3868, to remove chrominance during monochrome, or to provide an absolute zero chroma reference when displaying residual subcarrier. L3770 and C3780 is a series resonant circuit, tuned to the chroma center frequency when the oscilloscope is connected to TP3670.

CR3780 and CR3782 are a gain cell. The gain of the cell is determined by the current split between the series and shunt diodes. The Chroma Preset R7803 and CHROMA controls set the ratio of the dc currents in the gain cell which, in turn, set the ratio of the ac signal currents. The ac and dc current ratios are equal.

The output of the gain cell drives the operational amplifier, Q3684, Q3682, and Q3680, that drives the Alt V demodulator and the PAL simple-deluxe switching transformer.

PAL Simple-Deluxe Switching

When the front-panel PAL switch is set to the SIMPLE position, Q3590 and Q3580 are on, grounding the center of T3446's primary. The chroma signal is impressed across two separate secondaries to drive U3526 and U3510 with opposite-phase chroma information of equal amplitude.

When the PAL switch is set to DELUXE, Q3592 and Q3582 are switched on; Q3590 and Q3580 are turned off. The primary of T3446 consists of both windings in series, and the chroma information across either secondary winding is one-half amplitude.

PAL 180° Switcher

Because of the line-by-line inversion of the R-Y axis in the PAL system, it is necessary to switch the phase of the subcarrier applied to the V (R-Y) demodulator. This is accomplished by switching the subcarrier signal between the differential inputs of U3526. The output of the line rate flip-flop drives the PAL 180° switcher.

The switching signal grounds and un-grounds the differential inputs of the demodulator, alternately allowing the opposite input to be driven with the subcarrier signal. The input to the demodulator is grounded by turning on either Q3212 or Q3210. The V tilt adjustment, C3310, is a differential capacitor provided to ensure exact 180° switching.

Quad Phase

The quad phase network, consisting of L3110, C3206, and the switcher-grounded 90.9 Ω resistor (R3202 or R3208), provides the 90° shifted subcarrier between the U and V demodulators. The V Phase adjustment, C3314, located in the Alt V demodulator circuit, matches the demodulation axes of V (R-Y) and the Alt V channels.

Subcarrier Oscillator

The subcarrier oscillator is a varactor-diode-controlled, crystal oscillator, which can be varied about 200 Hz either side of 4.33619 MHz. L3104, C3108, and C3110 are a low pass filter for the 4.33619 MHz regenerated subcarrier.

Demodulators

The demodulators, U3544, U3526, and U3510, are differential devices driven single ended with the other input biased to a dc level. The demodulators require both input chrominance and regenerated subcarrier to operate. The output of the demodulators is applied to response filters, whose bandwidths are about 1.2 MHz.

V Phase C3314 is adjusted for best overlay of the color bars at TP3740 with MODE switch set to COLOR and the PAL pushbutton set to SIMPLE. V Tilt C3310 is adjusted to match the green-magenta color bar levels at the same test point (TP3740). The U Gain control R3510 is adjusted for proper color bar decoding at the green output TP6219 on the Kinescope Socket board. The filters, L3644, L3650, L3630, L3640, L3608, and L3610, are adjusted for best green-magenta transition at their respective test points: TP3720, TP3740, and TP3750.

Alt V Signal Amplifier

The Alt V signal output operational amplifier, Q3750, Q3752, and Q3754, has its gain set by the ratio of the amplifier feedback resistor, R3752, to the demodulator gain resistors, R3544 and R3546. If the operational amplifier output is not 0 V at horizontal sync time (no chroma should be present at this time), the sampling feedback clamp, Q3852 and U3850B, modifies the demodulator, U3544, bias current until the Alt V output is 0 V at sync time.

R-Y, G-Y, and B-Y Signal Amplifiers

The U and V signals from the demodulators drive the R-Y, G-Y, and B-Y operational amplifiers. The R-Y and B-Y signals are amplified by non-inverting, feedback-stabilized, voltage amplifiers. The input voltage signals are developed across the filter terminating resistors, R3640 and R3624. The R-Y gain is set by the ratio of the demodulator gain resistor, R3530, to the filter terminating resistor, R3640, and the amplifier gain-determining resistors, R3648 and R3746.

The G-Y signal is formed by the sum of the U and V signal currents through the terminating resistors, R3640 and R3624. The G-Y signal is amplified and inverted by the inverting operational amplifier to provide the G-Y output voltage. The G-Y gain is set by the ratio of the demodulator gain resistors, R3530, R3510, and R3512, to the operational feedback resistor, R3724.

The dc voltage at the output of the amplifiers is controlled by the sampled feedback clamps, operating at horizontal sync time (the stabilizing feedback loops are interdependent).

The G-Y Gain R3930 and B-Y Gain R3910 controls are adjusted for proper color bar decoding at their respective test points on the Kinescope Socket board: TP6219 and TP6235.

RGB Matrix

The gain and level set signals, R-Y, G-Y, and B-Y, from the operational amplifiers are resistively added to the luminance, Y, which was delayed to allow for the chroma processing. The resultant signals are decoded color currents (RGB) that drive the output amplifiers.

DEMOD TEST Pushbutton (PAL Decoder Matrix)

With the DEMOD TEST pushbutton switch set to the out position, the RGB matrix circuit is modified to largely compensate for limitations in available color phosphors. When the pushbutton is pressed in, the RGB matrix reverts to strict standard values to allow test and setup to be performed using a standard PAL color bar signal.

Insertion of the chroma correction matrix is controlled by transistor Q3733. With the DEMOD TEST pushbutton set to the out position as shown on diagram 8, Q3733 is turned on. This transistor turns on FETs Q3819, Q3823, and Q3817 to connect the chroma correction matrix resistors in the PAL decoder RGB matrix circuit. Using R-Y as an example, the correction resistors are R3851, R3723, and R3927.

If the DEMOD TEST pushbutton is pushed in, Q3733 turns off. The FETs turn off and the chroma correction matrix resistors are disconnected from the RGB matrix circuit.

The demodulated chroma outputs to P6258-1, -3, and -5 on the Option 2 board (see diagram 16) are picked off ahead of the chroma correction matrix resistors. These signals are not affected by the switching in or out of the correction resistors.

OUTPUT AMPLIFIERS (Diagram 10)

Purpose

This circuitry provides red, blue, and green decoded color-signal drive to the kinescope cathodes.

Input Amplifiers

These amplifiers amplify the incoming decoded color signals from the decoder.

The decoded red signal at P4051-4 is applied through a gain cell in U4137 to Q4417. At P4051-6, the decoded blue signal is applied through another gain cell in U4137 to Q4447. RED and BLUE GAIN adjustments are connected to the gain cells for setting high-light color temperature.

The decoded green signal at P4051-5 is applied directly to Q4477 since no green gain adjustment and, hence, no gain cell is needed in this circuit. Instead, the Contrast Preset adjustment shown on the Video Input schematic diagram is used for controlling the green gain.

Red, Blue, and Green Gain Adj controls (R4419, R4449, and R4479, respectively) set the operating point of the input amplifiers to prevent overdriving the output amplifiers.

One of the transistors (pins 12, 13, 14) in U4137 is not used. This transistor is biased to a negative potential to protect the active transistors being used on the same chip.

Auto Level

This circuit automatically sets the level of the input amplifiers for stable operation.

The negative-going 1 V black level sample pulse at P4023-4 is applied through Q4225 to the gating FETs, Q4503, Q4533, and Q4563. When these transistors are gated on, the signal present at the source element of each FET is stored in C4507, C4537, and C4567, respectively. Since the red, blue, and green circuits are similar, the remaining explanation describes the red auto level circuit.

The voltage at pin 2 of U4505 is compared to the voltage level set by the front-panel RED BIAS adjustment. This adjustment sets the low-light color temperature (red kinescope bias). At the output of U4505, the difference signal is applied to Q4315. This signal becomes the auto level signal at Q4315 collector for application to the emitter circuits of Q4417.

The SCREEN switch operates by ground closure or absence of horizontal sync to turn off the kinescope cathodes. Ground closure is achieved by setting the RED, BLUE, or GREEN SCREEN switch to the OFF position. Using the RED switch as an example, the switch turns on Q4205 through U4107 to sink the drive signal applied to the red input amplifier circuit.

NOTE

Since the limiter and output amplifier stages for the red, blue, and green circuits are identical, only the red signal circuits are described in the text that follows.

Limiter (Red Decoded Signal)

This circuit limits maximum signal excursions to prevent overdriving the output amplifier.

The diode bridge, consisting of CR4625, CR4723, CR4623, and CR4721, limits the black and white levels of the red decoded signal. Diode CR4629 provides a current path for CR4625 during black level limiting when CR4623 is off; CR4725 provides a current path for CR4623 when CR4625 is off during white level limiting. Maximum white level excursions are limited by current established in R4627 and R4621; black level is limited by the current in R4729.

Red Output

This amplifier provides decoded red color-signal drive to the kinescope red cathode.

The output swings between 20 V and 100 V. Output level is sampled and used as a reference for the red auto level circuit. CR4825 and CR4827 protect the amplifier during kinescope arcing.

DEFLECTION CIRCUITS

(Diagrams 11 , 12 , & 13)

Purpose

Circuitry on these diagrams provide drive to deflect the electron beams and provide dynamic magnetic convergence and correction signals to compensate for deflection distortion. See Figs. 7-1 and 7-2 on the following pages.

Vertical Gate

Q5995 and Q5984 in the vertical gate circuit use the negative-going vertical drive signal from diagram 3 to reset the vertical ramp generator to zero after each runup. If no vertical drive signal is present, the vertical ramp generator overruns and triggers Q5990. Q5972 resets the vertical ramp to zero.

Q5990 is a programmable unijunction transistor, triggered into conduction by negatively biasing the anode gate in respect to the anode. It is commonly referred to as the "PUT".

Q5995 and Q5984 are also used to drive the vertical retrace pull up circuit to allow rapid retrace. Also, Q5995 provides a negative-going gate and Q5988 provides a positive-going gate to the vertical parabola and S generators.

Vertical Ramp Generator

The vertical ramp generator, U5975 and Q5972, is a Miller integrator that provides a positive-going sawtooth waveform which is approximately 10 V in amplitude. During normal operation, the peak ramp voltage is controlled by the vertical drive signal, which resets the ramp to zero druing the vertical retrace interval. If the drive signal is not present, the vertical ramp generator runs up to approximately 12 V. This peak voltage triggers Q5990, which resets the ramp via Q5995 and Q5984 to zero, initiating the vertical retrace; thus, maintaining a free-running vertical sawtooth.

For 50 Hz operation, the values of R5980 and R5978 are increased slightly to allow the ramp to reach peak voltage at the 50 Hz repetition rate.

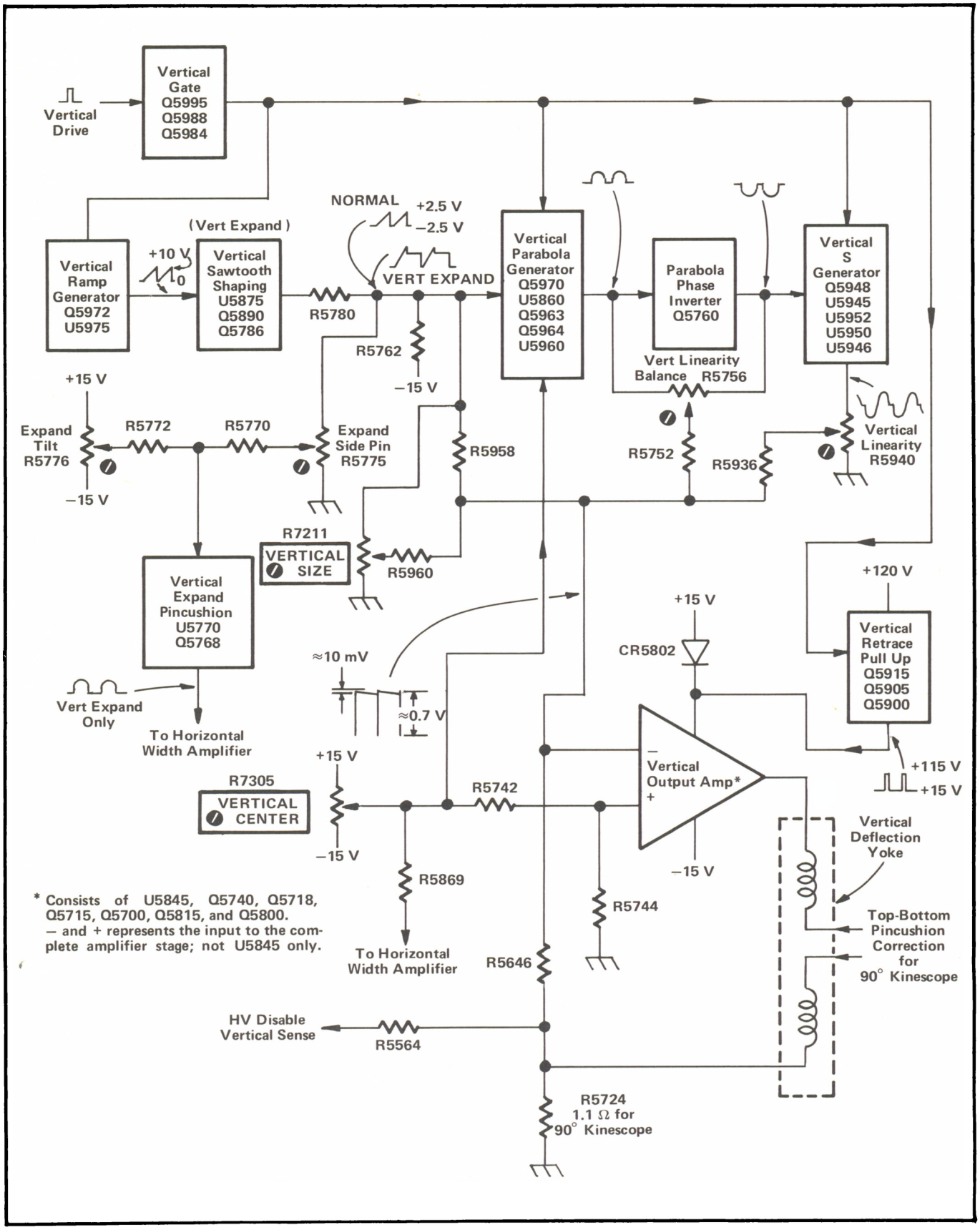


Fig. 7-1. Functional block diagram of vertical deflection circuit.

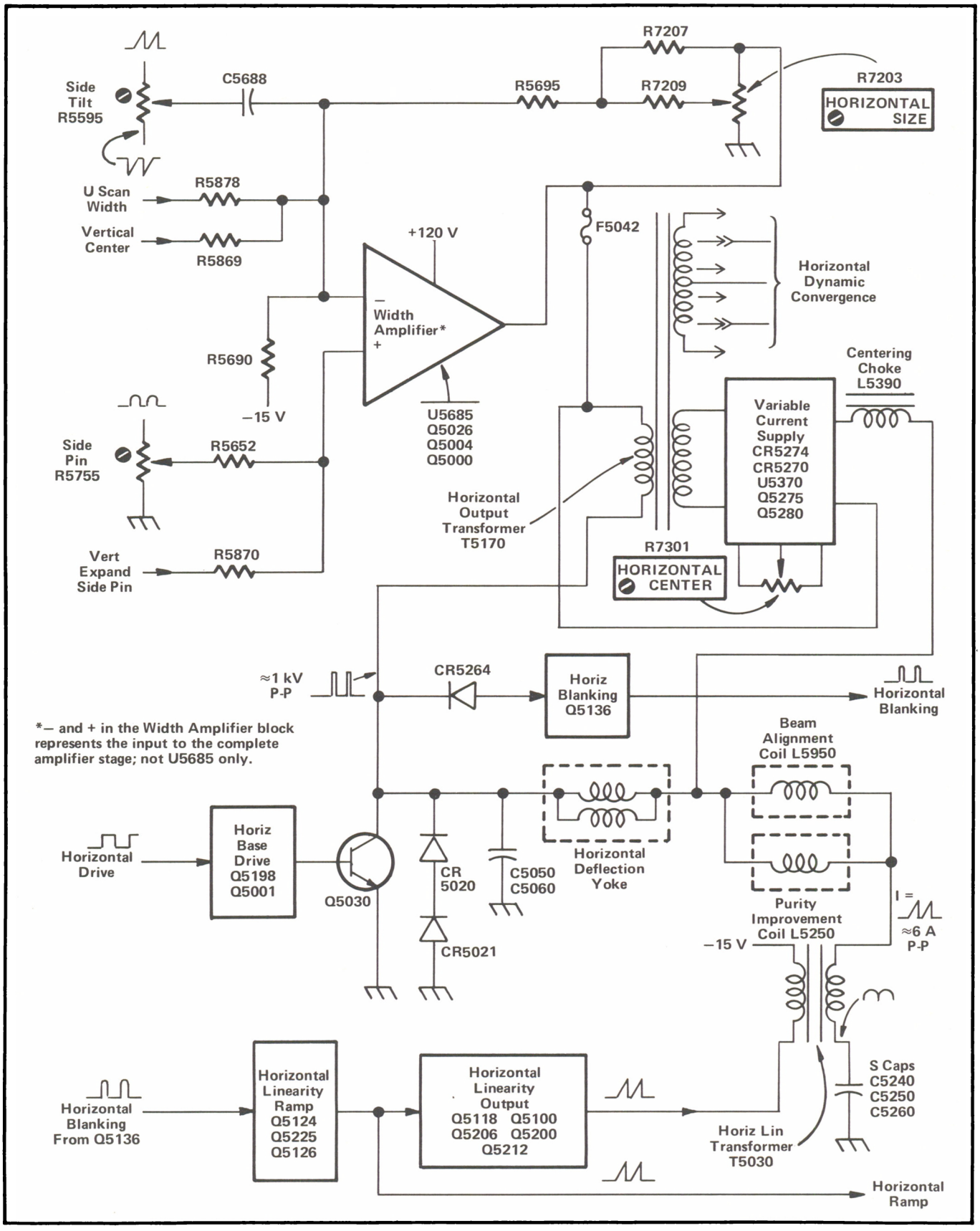


Fig. 7-2. Functional block diagram of horizontal deflection circuit.

Vertical Sawtooth Shaping

The vertical sawtooth shaping circuit, U5875, Q5890, and Q5786, passes the sawtooth at full amplitude and centers the voltage around zero by means of resistors R5780 and R5762. In vertical expand mode of operation, Q5886 saturates, U5875 then has voltage gain and expands the sweep waveform. Approximately +5 volts on pin 3 of P5899 delays the vertical drive so that the vertical blanking interval is displayed.

In vertical expand mode, as the ramp increases in amplitude, a point is reached where CR5782 turns on, saturating Q5786. At this time the vertical ramp at the anode of CR5786 is shorted to ground. With the ramp returned to ground instead of −15 V, the output amplifier dissipates less power during the vertical blanking interval.

U Scan

In underscan mode of operation, +15 volts from pin 5 of P5899 reduces the vertical sawtooth run-up rate by supplying current through R5978. R5758 then reestablishes the vertical sawtooth dc level. Width is reduced by supplying current through R5878 to U5685 (width regulator).

The underscan switching transistors, Q5648 and Q5840, reduce the vertical and horizontal linearity waveforms, and the side pin waveform.

Vertical Retrace Pull Up

A positive-going vertical gate is applied from Q5984 to the base of Q5915 in the vertical retrace pull up circuit. This gate turns on Q5915 during the vertical retrace interval. The amplified gate from Q5915 turns on Q5905 and Q5900. As a result, the collector supply for Q5815 and Q5800 is increased toward +120 V, allowing rapid retrace.

Also, the negative-going pulse at the output of Q5915 is used to ensure full turn-on of Q5815 and Q5800 during the vertical retrace interval.

Vertical Output Amplifier

The S waveform, vertical parabola, centering current and vertical rate sawtooth are applied to an amplifier, U5845. A 1.1 Ω resistor, R5724, samples the vertical deflection yoke current, setting a feedback current at the + input of U5845. The output of U5845 is the emitter current for Q5740.

The vertical output amplifier, U5845, Q5740, Q5718, Q5715, Q5700, Q5815, and Q5800, is an operational amplifier. Q5700 and Q5800 operate on different halves of the deflection waveform, with both conducting partially when the beam is at mid screen.

During vertical retrace, Q5915, Q5905, and Q5900 conduct and the collector supply for Q5815 and Q5800 increases toward +120 V to speed up retrace.

Vertical Expand Enable Logic

Q5894, with associated circuitry, provides the logic that determines whether the monitor is operating in norman scan with vertical delay and vertical expand or in underscan with vertical delay but without vertical expand.

During vertical delay with vertical expand, a high is applied via P5899-3 to the vertical counter on the Sync & Timing diagram 3. This high moves the vertical drive pulse so that the vertical ramp generator is delayed to approximately 3/4 of a field. In underscan, the vertical expand feature is inhibited.

Vertical Expand Blanking

During vertical expand, Q5788 generates a vertical blanking pulse that is summed with the vertical drive pulse. During normal scan without vertical delay, Q5788 is turned off and the vertical drive signal becomes the vertical blanking signal. The vertical blanking signal is applied through the blanking circuit on diagram 14 to the kinescope control grid.

Vertical Expand Pincushion

U5770 and Q5768 in the vertical expand pincushion circuit provide fast side pincushion and tilt to the horizontal size circuit on diagram 12 in the vertical expand mode so that the horizontal width can be properly compensated.

U5875 drives an operational amplifier, U5770. U5770 and C5765 are an integrator, integrating the vertical sawtooth waveform to provide the expanded scan parabola for side pincushion correction.

The Expand Side Pin R5775 and Expand Tilt R5776 adjustments are adjusted so that the left and right sides of the displayed crosshatch pattern are straight; that is minimum bowing and tilt.

Vertical Parabola Generator

The vertical parabola generator consists of Q5970, U5860, Q5963, Q5964, U5960, and associated circuitry. During the active portion of the ramp, Q5963 is on; Q5964 and Q5970 are off, and the ramp is integrated by C5960. During vertical retrace, the charge on C5960 is coupled through Q5970 to C5858. Q5970 and Q5964 are on; Q5963 is off. A dc voltage is present in the output of U5860, causing the output of U5960 to integrate to zero, forming the parabola waveform.

The VERTICAL CENTERing control is fed into the vertical parabola generator to provide an offset on the vertical parabola for side pincushion correction. This correction allows the picture to be positioned vertically without displaying objectionable keystone effect.

Parabola Phase Inverter

Q5760 is a phase splitter to provide two polarities of parabola for linearity balance of the vertical yoke waveform. Also, an inverted parabola is applied to the horizontal linearity ramp circuit on diagram 12 to provide side pin correction.

The Vert Linearity Balance control R5756 is adjusted for best vertical linearity of the displayed crosshatch pattern on the monitor.

Vertical S Generator

The vertical S generator, consisting of Q5948, Q5952, Q5950, U5945, and U5946, integrates the corrected vertical parabola from the collector of Q5760. The output signal at pin 6 of U5946 provides S correction for the vertical scan signal. The integrating action of the vertical S generator is identical to the parabola generator described earlier, except that the VERTICAL CENTERing control is not connected to the generator.

The Vertical Linearity control R5940 is adjusted for proper vertical linearity when a crosshatch pattern is displayed on the monitor.

Pincushion Phase T5830

The pincushion correction waveform from Q5730 on diagram 13 is applied through T5830 to the vertical deflection yoke. This waveform bows the scanning lines up at the top of the screen. Bowing of the scanning lines decreases, then inverts at mid screen. Maximum bowing downward of the scanning lines occurs at the bottom of the screen.

Pincushion Phase adjustment T5830 is adjusted to move any bowing of the top horizontal line of the crosshatch pattern to the center of the line. Then, the Vert Pin Bal R5535 and Vert Pin Ampl R5540 adjustments on diagram 13 are adjusted to minimize the bowing.

Also included in this circuit block is R5724, which is a current-sense resistor for the yoke feedback.

Horizontal Linearity Ramp

The horizontal linearity ramp circuit, Q5124, Q5225, and Q5126, driven by the horizontal blanking pulse from Q5136, produces the horizontal linearity ramp. A vertical rate parabola from Q5760 on diagram 11 is applied to the horizontal linearity ramp to provide additional side pincushion correction at the center of vertical deflection. The linearity ramp is reduced during underscan by connecting one end of R5226 to +15 V via the SCAN switch.

Horizontal Linearity Output and Dynamic Convergence

The horizontal linearity ramp circuit drives a unity gain amplifier, Q5118, Q5206, Q5100, Q5212, and Q5200. The output of this amplifier drives T5030, supplying a sawtooth voltage in series with the horizontal deflection yoke. The linearity ramp expands the scan at the right side of the screen and compresses it at the left side to compensate for the resistive losses in the yoke.

T5030 has a center tap going through C5038 to the red and blue beam horizontal dynamic convergence yoke L5400. The red and blue rasters are larger than the green raster on a 90° 17-inch Trinitron kinescope. Therefore, it is necessary to make the red and blue rasters equal in size to the green raster for proper convergence. This is accomplished magnetically.

The convergence yoke is composed of one set of coils located on one side of the kinescope neck and the other set of coils located on the other side of the neck. The ends of the coils are connected to pins 3 and 6 of the horizontal output transformer T5170. Taps are provided on the transformer and these are labeled Blue Width and Red Width on the diagram. These taps are used to electrically change the size of the red and blue rasters.

Pin 20 of T5170 receives pulse and ramp signals which are, in turn, integrated into a ramp of current and a parabola of current by the inductance of the convergence yoke.

Horizontal Width Amplifier

Q5648, U5685, Q5026, Q5004, and Q5000 are the width control regulator, powering the horizontal output.

The regulator is a fed-back amplifier using the HORIZONTAL SIZE control as a feed-back resistor. By adjusting this control, the amount of feedback current delivered to the + input of U5685 can be changed.

Side tilt, underscan width, underscan activate, vertical parabola, and expand side pincushion signals are all applied to the appropriate points in the circuit to modulate the width amplifier.

Horizontal Output

The horizontal drive pulse from U1127B on the Sync & Timing diagram 4 is applied to Q5198 base. Q5198 drives Q5001 which, in turn, drives the horizontal driver transformer T5030. The transformer drives Q5030, which drives the hoizontal output transformer T5170 and the horizontal deflection yoke.

CR5020 and CR5021 are damper diodes that are mounted on a heat sink near Q5030. If the horizontal drive pulse fails, Q5198 turns on to protect T5090.

Referring to the horizontal deflection yoke circuitry, L5950 is a beam alignment coil that is part of the vertical convergence coil form. L5950 is heated by the kinescope filament to change its inductance. The amount of current passing through L5950 affects the purity in such a manner that it compensates for the heating of the grid in the kinescope.

L5950 works in conjunction with L5250. Coil L5250 is mounted on a metal ring with the deflection yoke so that it is heated by the yoke. Both L5950 and L5250 are temperature sensitive due to the temperature-sensitive permeability of the cores.

Horizontal Centering

The secondary circuit of the horizontal output transformer T5170, consisting mainly of CR5274, CR5270, U5370, Q5275, Q5280, and the centering current sampling resistor R5266, make up an isolated power supply and regulator for the horizontal centering current.

Horizontal centering current flows in the centering choke L5390, horizontal deflection yoke, and the primary of the horizontal output transformer.

Horizontal Parabola Correction

The horizontal rate sawtooth signal in the horizontal deflection yoke is integrated by the S correction capacitors C5240, C5250, and C5260, providing a parabola waveform in series with the yoke. The parabola signal causes the sawtooth ramp in the yoke to have a slight S shape. The S correction signal expands the scan at the center of the screen, while compressing the ends, to compensate for geometric distortion of the scan.

Horizontal Blanking

The positive-going flyback pulse from the primary winding of the horizontal output transformer T5170 drives Q5136, an emitter follower.

From the emitter of Q5136, the pulse drives Q5124 in the horizontal linearity ramp circuit on this diagram, Q1155 in the horizontal delay control circuit on the Sync & Timing board (diagram 4), Q5020 in the horizontal tilt circuit on diagram 13, and Q6821 in the blanking circuit on diagram 14.

Horizontal Convergence

This circuit is an operational amplifier whose output stage is Q5400 and Q5300. These two transistors together drive the horizontal output transformer T5170 on diagram 12, which drives one-half of the horizontal convergence yoke L5450.

Two signals drive the amplifier. One is the horizontal ramp; the other is the horizontal tilt pulse. The horizontal tilt pulse is a choice between positive and negative polarity of a blanking pulse from phase splitter Q5020. This positive or negative pulse is applied to Q5426, which drives the summing junction at the base of Q5416.

The horizontal ramp is applied from R5318 through R5320 to the summing junction at Q5416. The pulse and the ramp are integrated by the convergence yoke to a ramp and parabola of current, respectively.

During underscan activate, Q5424 turns off to change the amplitude of the horizontal convergence output as well as provide a voltage signal across the Underscan Horiz Static control R5435. The underscan horizontal static signal from R5435 is applied via the blanking and EHT boards (diagram 14) to the kinescope convergence electrode. During normal scan, Q5424 saturates and the horizontal convergence gain is restored to full output.

Top & Bottom Pincushion

The horizontal rate parabola is modulated by the vertical sawtooth and applied to the top and bottom pincushion circuit to obtain a pincushion waveform. Pincushion effect is greatest at the top and bottom of the screen. The phase of the correction is changed at the center of the screen.

Q5556 with CR5544, CR5548, CR5550, and CR5546 is a balanced modulator circuit for developing the pincushion waveform. The pincushion waveform is applied through an operational amplifier (Q5640, Q5730) to the pincushion transformer T5830. From here the waveform is applied to the vertical deflection yoke. The waveform bows the scan lines up at the top of the screen. Bowing of the scanning lines reduces, then inverts at mid screen. Maximum bowing downward of the scanning lines occurs at the bottom of the screen.

With a crosshatch pattern displayed by the monitor and the test oscilloscope connected to TP5831 (diagram 11), Pincushion Phase T5830, Vert Pin Ampl R5540, and Vert Pin Bal R5535 are all adjusted to obtain straight horizontal lines with minimum tilt. The oscilloscope is used to monitor the amplitude and waveshape of the waveform.

Scan Failure Detector

The scan failure protection circuit, U5575 with associated components, protects the kinescope from damage due to deflection circuit failure.

During normal operation, the vertical rate ramp from the yoke return is applied to U5575 plus (+) input. The vertical rate square wave output of U5575 charges C5576 to approximately +10 volts, keeping U6619 in the high-voltage oscillator circuit (diagram 14) active. CR5568 rectifies the horizontal parabola signal, preventing CR5570 from conducting. This enables the output of U5575 to produce the vertical rate square wave.

If either scan signal is missing, the output of U5575 goes less positive, U6619 is no longer activated, and the 2H-rate signal that drives the high-voltage oscillator is inhibited.

Vertical Convergence

The vertical convergence circuit, consisting of U5665, Q5658, and Q5656, accepts a combination of vertical parabola, ramp, and static signals to provide for vertical static, tilt, and parabola convergence.

VERTICAL STATIC and VERTICAL TILT are front-panel controls that feed the vertical ramp and static signals from Q5585 to pin 3 of U5665. The output signal from Q5658 and Q5656 is applied to the vertical convergence coil L5900 located on the neck of the kinescope. R5664 is a current-sampling feed-back resistor.

Vertical Ramp Attenuator and Inverter

When set to SETUP, the VERT SCAN switch turns on Q5586, which attenuates the vertical ramp to approximately 1/10 of its size and also inhibits the vertical integrators so that no corrections are made on the waveform. Q5586 also blocks the scan failure detector so that the high-voltage oscillator will continue to operate.

The vertical ramp inverter Q5585 is a phase splitter to provide two phases of vertical ramp for correcting vertical tilt and convergence skew; also side tilt for the horizontal circuit.

Vertical Rate Horizontal Convergence

The vertical rate horizontal convergence circuit consists of U5620, Q5508, and Q5506 with associated components. This circuit applies a parabola, which is called bow, and a vertical rate ramp, which is called skew, to one-half of the horizontal convergence yoke L5450.

Q5508 and Q5506 are used together as an amplifier, with R5518 used as a current feedback sensing resistor. The voltage that is sensed at TP5506 is the integral of the ramp and parabola current due to the RC ratio of C5720 and R5518.

BLANKING & KINESCOPE (Diagram 14)

Purpose

The blanking and kinescope circuitry provides the following signal and voltages to the kinescope:

1. Blanking signal to the kinescope control grid.
2. High voltage to the anode.
3. Horizontal static convergence voltage ot the convergence electrode.
4. Screen voltage to the kinescope screen grid.
5. Dynamic focus voltage to the focus electrode.

Blanking

The blanking circuit, Q6821, Q6825, and Q6837, is an operational amplifier that receives a horizontal blanking signal from the horizontal deflection circuit on diagram 12 and a vertical blanking signal from the vertical deflection circuit on diagram 11. The vertical deflection circuit provides the proper blanking signal for normal scan as well as vertical expand. CR6807 provides a dc offset voltage for the vertical blanking signal.

Q6821 is the input transistor; Q6825 and Q6837 are the output transistors. R6811 is the feedback resistor. The output signal is clamped by CR6883 to −15 V and the signal swings negative approximately 100 V from this point. Since only +120 V is available for circuit operation, clamping to +15 V provides the extra voltage needed for cutting off the kinescope.

R6717 and R6215 are series-connected resistors to limit the current returned to the blanking circuit during a kinescope arc. A spark gap is located at each input (except pin 14) to the kinescope socket connections. These spark gaps limit the voltage at each point so that the current into the kinescope circuits is held to a reasonable value during kinescope arcing.

High-Voltage Oscillator and EHT

The high-voltage supply, which provides +24 kV to the kinescope anode, is a pulse-amplitude modulated supply. The primary of output transformer T6371 is resonated near the horizontal rate by C6573 and C6473. T6371 secondary drives the high-voltage multiplier in the EHT circuit. A feedback voltage is derived from the high-voltage thick-film resistor R6191A, B, and C. R6191C is the input resistor for the supply; the sum of R6191A and R6191B is the feedback resistance that provides the +24 kV.

U6401 is the gain element for the primary regulator loop. Ac gain is limited by the feedback elements connected from pin 6 to pin 2 of U6401.

The signal that drives the high-voltage oscillator circuit is the 2H-rate pulses from the horizontal drive circuit located on diagram 4. These pulses are applied to pins 3 and 4 of U6619, which is an integrated one-shot. Transistor Q6737 changes the pulses from a fast-rise front to a ramp front for driving the supply with greater efficiency.

The drive to Q6737 is disabled if either deflection signal is not present. P6701-4 and pin 5 of U6619 go low, disabling the high voltage.

Q6461, a monolithic darlington-connected amplifier, drives Q6481. Depending on the pulse height at TP6419, Q6481 provides a regulated amount of current in the current pulse from R6507. TP6419 can be viewed as a Thevinin-equivalent voltage source that is shorted to ground by Q6737 at the 2H-rate. U6401 modulates the pulse amplitude.

Q6481 applies the pulses to Q6679 and Q6477. Only one of these transistors is on at a time. The output sine wave from T6371 is 15 kHz, whereas the input is driven at 30 kHz. The 15 KHz sine wave at pin 8 of T6371 is approximately 1000 V p-p in amplitude, and is rectified by CR6453. C6541 and C6543 with the voltage-equalizing resistors, R6459 and R6463, provide adequate filtering of the 500 V supply.

To provide secondary regulation for the kinescope anode supply, Q6663 senses the +500 V supply. If the primary regulator circuit fails, the secondary regulator prevents excessive anode voltage rise. This is accomplished by applying the 500 V to Q6663, which compares this voltage to −15 V. R6551 is the input resistor and R6545 is the feedback resistor. Q6653 is a current-overload sensing transistor. It senses the amount of current being supplied to the high-voltage output through R6507 and draws current away from the base drive to Q6461 if the current is excessive.

The H-rate sine wave at pin 10 of T6371 is applied through P6055 to the high-voltage multiplier in the EHT circuit. The multiplier raises the voltage to +24 kV, which is applied through R6187 to the kinescope anode. R6187 limits the current from the multiplier in the event that the anode is shorted to ground during arcing, testing, etc.

Neon DS6130 illuminates when there is voltage across the 225 MΩ and 11 MΩ divider resistors of R6191.

Certain failures in the high-voltage supply can cause the kinescope anode supply to increase and become unregulated. Indications of this possibility are inadequate horizontal size or a change in the horizontal static convergence range. Caution should be used when measuring the anode supply to prevent electrical shock to yourself and to prevent accidental circuit failures.

Horizontal Static Convergence Driver

Q6092, Q6190, Q6170, and U6074 are the active components in this circuit, which (combined with R6425, R6426, R6427, R6503, and C6503 on the Blanking board) provides a means for adjusting the horizontal static convergence for normal scan as well as for underscan. Underscan Horiz Static adjustment R5435 is located in the horizontal convergence circuit on diagram 13.

Q6092, Q6190, and Q6170 receive the horizontal blanking signal from P6501-3 on the Blanking board and provide a signal with approximately equal positive and negative peaks at T6160. This signal is coupled by T6160 and T6184 on the EHT board to a doubler to control the convergence electrode voltage.

U6074 provides a feedback loop for maintaining a stable signal level at the voltage-doubler input. This circuit also serves as a convenient point to introduce front-panel horizontal static convergence control.

Underscan Horiz Static control R5435, located in the horizontal convergence circuit on diagram 13, is adjusted for best convergence in underscan mode of operation, and operates similar to the HORIZ STATIC control.

CR6194, CR6181, C6182, C6193, and R6180 compose the horizontal static convergence supply voltage-doubler circuit. R6180 is a bleeder resistor for the current that may be coming back from the convergence lead. Spark gap E6186 protects C6185 if the kinescope should arc.

Anode AC Feedback

The twisted-pair etched circuit runs connected between P6000 and P6100 couple a portion of the anode's ac voltage variations from the aquadag coating on the kinescope to U6401, the high-voltage regulator on the Blanking board. This feedback loop provides improved high-voltage regulation for the anode. The twisted-pair configuration helps to cancel out unwanted signals.

Screen Volts

The screen volts circuit consists of Q6771, U6723, Q6747, and Q6733. This circuit is basically an operational amplifier, with R6767 being used as the feedback resistor for U6723; R6775 is the input resistor. The input current can be changed by adjusting Screen Volts control R6785. In the adjustment procedure, R6785 is used as a bias adjustment for setting low-light color temperature of the most dominant color.

If the anode current exceeds 1.5 mA, CR6763 and CR6755 turn on, the screen voltage decreases, and Q6733 turns on, lighting the front-panel OVERLOAD indicator. This circuit protects the high-voltage power supply from high power dissipation damage.

Dynamic Focus

The dynamic focus circuit is an operational amplifier consisting of Q6923 and Q6935. This circuit provides a parabolic vertical-rate waveform to the kinescope focus electrode. The waveform is normally approximately zero volts at the center of the screen, and about 350 V at the top and bottom of the screen.

A vertical-rate parabola from the vertical parabola generator on diagram 11 is applied to Q6923. R6903 is the input resistor and R6933 is the feedback resistor. CR6915 and CR6905 are clamping diodes for dc restoration of the input signal.

LV POWER SUPPLY (Diagram 15)

Purpose

The LV Power Supply circuitry provides regulated −15 V, +5 V, +15 V, and +120 V power sources required to operate the various circuits in the instrument. Also, degaussing current is provided to demagnetize metal parts of the kinescope.

−15 Volt Supply

The −15 V supply is the reference supply for all the other power supplies. The −15 V supply attains its low impedance, stability, and accuracy from a monolithic precision voltage regulator, U8135. This device consists of a temperature-compensated reference amplifier, error amplifier, output driver, and a current limiter.

The −15 V Adj control, R8121, adjusts the −15 V supply. This control sets the voltage on pin 4, which is the inverting input of U8135. This voltage is compared with the voltage on pin 5, which is the non-inverting input. The reference voltage from pin 6 is supplied to pin 5 through R8033. The output from pin 11 drives Q8881. Q8881 drives the series-regulator transistor, Q8891.

Current limit is achieved by applying the voltage developed across R8151 to pin 2 (current limit) and pin 3 (current sense) of U8135. When the voltage from pin 3 to pin 2 increases to 0.6 volt, the −15 V supply goes into current limit.

R8233 and C8241, connected from pin 11 to pin 13 of U8135, compensate the high-frequency gain of the −15 V supply. CR8095 prevents the −15 V supply from reversing its voltage.

+15 Volt Supply

The +15 V supply is similar to the −15 V supply. Q8801 is the series-pass transistor for the +15 V supply. Driver transistor Q8821 is driven from pin 11 of U8105. These circuits are similar to the −15 V supply. However, the −15 V supply is used as the reference for the +15 V supply instead of using an internal reference amplifier. Current limit is the same as that of the −15 V supply. F8825 protects Q8831 and VR8931 in case the +15 V supply shorts to its unregulated supply and the +5 V supply shorts to ground.

+5 Volt Supply

The +5 V supply provides the V_{cc} for the IC's used in the instrument. This supply is derived from the +15 V supply. Q8841 is a shunt regulator receiving drive from Q8283. VR8909 provides over-voltage protection for the +5 V supply. The current is limited by the +15 V current limit. CR8183 provides temperature compensation for the +5 V supply.

Kinescope Filament Supply

The +15 V supply provides the current for the kinescope filament. R8997 sets the current. Q8831 and VR8931 provide over-voltage protection for the kinescope filament in the event of +5 V or +15 V supply failures.

+120 Volt Supply

The +120 V supply is primarily used by the video output, deflection, and high-voltage circuits. Comparator Q8481 amplifies the error voltage developed by the precision voltage-divider, R8485 and R8465. Q8481 drives the base of Q8381, which drives the base of Q8861. Transistor Q8861 drives the series-regulator transistor, Q8929.

The +120 V supply is designed to current foldback when excessive current is drawn. Current-foldback limiting protects the series-regulator transistor from second breakdown and over-dissipation. The current-foldback error voltage is developed across R8191. When the voltage across R8191 increases to about 0.7 volts, Q8483 conducts and a portion of Q8481 emitter current flows through Q8483. As a result, drive current from Q8381 is removed and the +120 V supply starts to shut down.

When the +120 V supply approaches zero, the current through R8287 that was supplied by R8385 is reduced to zero. Thus, no voltage is developed across R8191. The voltage, that appears across R8191 to keep Q8483 on, is the difference between the voltage across CR8387 and the base-emitter drop of Q8483. The difference voltage is 0.2 volt or about 0.2 A through R8191.

Over-voltage protection is required to prevent the high-voltage supply from soaring. If the +120 V supply attempts to go above +140 V, VR8487 conducts. VR8487 supplies gate current to SCR Q8567, thus shorting the +120 V supply to ground. As a result, the +120 V supply will go into current foldback and remain in this condition until the line voltage is removed to turn off SCR Q8567. Should the series-regulator transistor become shorted, or the current foldback not operate, fuse F8851 will blow and fuse indicator DS8863 will light.

Current foldback is the reduction of both the voltage and current output of the supply when reaching current limit.

Degauss

A degaussing coil, L8985, is used to demagnetize the metal parts of the kinescope. The coil is driven from the 120 V supply secondary winding of T8891 when the DEGAUSS switch S8993 is activated. Degaussing current decreases to zero as the thermistor, RT8981, heats.

FRONT-PANEL CONTROLS & OPTION 2 (Diagram 16)

Purpose

The front-panel controls provide a convenient grouping of the switches, controls, and adjustments that are most frequently used during operation.

Left Front Panel

The controls and switches that are located on the tilt-out front panel are primarily calibration adjustments. These controls are protected from accidental misadjustment by a lockable door. Controls located here are the GAIN and BIAS for the three color cathodes, along with the switches to operate each cathode independently. The VERT SCAN switch in the SETUP position compresses the vertical scan to 10% height to permit adjustment of the color cathodes.

The VERT SIZE, VERT CENTERing, HORIZ SIZE, HORIZ CENTERing, and the CONVERGENCE controls are also located on the tilt-out panel. Other convergence adjustments are located within the instrument.

Right Front Panel

The right front-panel controls are the ones most frequently used in everyday operation. For the 670A Monitor, this grouping includes POWER, DEGAUSS, INPUT, SYNC, MODE, BRIGHTNESS, CONTRAST, APERTURE, CHROMA, HUE, SCAN Size, Horiz Delay, Vert Delay, and NTSC TEST. The controls for the 671A Monitor are identical except that a PAL (SIMPLE-DELUXE) pushbutton in installed in place of the NTSC TEST pushbutton. Also, a DEMOD TEST pushbutton is installed next to the PAL pushbutton. The HUE control is not present, since it is not needed.

The PRESET adjustments for the BRIGHTNESS, CONTRAST, APERTURE, CHROMA, and HUE controls are accessible through the bottom of the instrument near the controls. The make-up of the right front panel is dependent on the Decoder board incorporated in the monitor.

Three indicator lamps, DS7705, DS7901, and DS7903 are also located on the right front panel. DS7705 is the OVERLOAD lamp, which lights whenever the kinescope overdrive protection circuit is in operation.

DS7901 is the UNCAL lamp, which operates under the following conditions:

1. Whenever the BRIGHTNESS, CONTRAST, CHROMA, HUE (670A Monitor), or any combination of these controls are out of the PRESET position.

2. Whenever the Horiz Delay, Vert Delay, or both pushbuttons are depressed.

DS7903 is the TEST lamp, which operates when the NTSC TEST (670A Monitor), or DEMOD TEST or SIMPLE-DELUXE (671A Monitor) pushbutton is depressed.

Tally Lights

The 670A-Series Monitor are equipped with externally-powered tally lights, DS9007 and DS9011, which require 24 V to operate.

Degauss (located on the LV Power Supply diagram)

A degaussing coil, L8985, is used to demagnetize the metal parts of the kinescope.

Option 2

R-Y or V and B-Y or U VECTOR OUTPUT connectors on the rear panel provide the demodulated chroma signal, suitable for driving an X-Y oscilloscope. R6261 and R6279 set the output signal levels to correspond to a compass rose diameter of 800 mV.

OPTIONS

This section provides information on catalog options offered for the 670A and 671A Color Picture Monitors. Custom modifications are negotiated and documented separately.

OPTION 2—VECTOR OUTPUTS

This option provides R-Y or V and B-Y or U output signals that are highly accurate and stable in phase and gain. These color difference signals may be used to provide a very accurate vectorscope display on any suitable X-Y oscilloscope.

The outputs are set at correct levels to drive TEKTRONIX 602 and 604 Display Monitors. These units are available with an internal vectorscope graticule suitable for both NTSC and PAL systems when ordered with Option 5.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

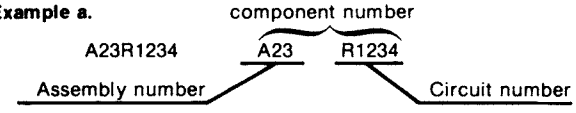
ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

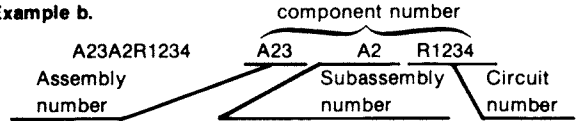
A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.



Read: Resistor 1234 of Assembly 23

Example b.



Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
0000L	MATSUSHITA ELECTRIC	200 PARK AVENUE, 54TH FLOOR	NEW YORK, NY 10017
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
03508	GENERAL ELECTRIC COMPANY, SEMI-CONDUCTOR PRODUCTS DEPARTMENT	ELECTRONICS PARK	SYRACUSE, NY 13201
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05397	UNION CARBIDE CORPORATION, MATERIALS SYSTEMS DIVISION	11901 MADISON AVENUE	CLEVELAND, OH 44101
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
08806	GENERAL ELECTRIC CO., MINIATURE LAMP PRODUCTS DEPARTMENT	NELA PARK	CLEVELAND, OH 44112
12954	SIEMENS CORPORATION, COMPONENTS GROUP	8700 E THOMAS RD, P O BOX 1390	SCOTTSDALE, AZ 85252
14936	GENERAL INSTRUMENT CORP., SEMICONDUCTOR PRODUCTS GROUP	P.O. BOX 600,600 W. JOHN ST.	HICKSVILLE, NY 11802
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
24546	CORNING GLASS WORKS, ELECTRONIC COMPONENTS DIVISION	550 HIGH STREET	BRADFORD, PA 16701
25088	SIEMENS CORP.	186 WOOD AVE. S	ISELIN, NJ 08830
25403	AMPEREX ELECTRONIC CORP., SEMICONDUCTOR AND MICROCIRCUITS DIV.	PROVIDENCE PIKE	SLATERSVILLE, RI 02876
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
27193	CUTLER-HAMMER, INC. SPECIALTY PRODUCTS DIVISION	4201 N. 27TH ST.	MILWAUKEE, WI 53216
28480	HEWLETT-PACKARD CO., CORPORATE HQ.	1501 PAGE MILL RD.	PALO ALTO, CA 94304
32159	WEST-CAP ARIZONA	2201 E. ELVIRA ROAD	TUCSON, AZ 85706
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
37942	MALLORY, P. R., AND CO., INC.	3029 EAST WASHINGTON ST.	INDIANAPOLIS, IN 46206
51406	MURATA CORPORATION OF AMERICA	2 WESTCHESTER PLAZA	ELMSFORD, NY 10523
55292	LEDCO DIV., WILBRECHT ELECTRONICS, INC.	240 EAST PLATO BLVD.	ST. PAUL, MN 55107
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
72136	ELECTRO MOTIVE CORPORATION, SUB OF INTERNATIONAL ELECTRONICS CORPORATION	SOUTH PARK AND JOHN STREETS	WILLIMANTIC, CT 06226
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
73445	AMPEREX ELECTRONIC CORP.	230 DUFFY AVE.	HICKSVILLE, L. I., NY 11802
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
74276	SIGNALITE DIV., GENERAL INSTRUMENT CORP.	1933 HECK AVE.	NEPTUNE, NJ 07753
74970	JOHNSON, E. F., CO.	299 10TH AVE. S. W.	WASECA, MN 56093
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
75378	CTS KNIGHTS, INC.	400 REIMANN AVE.	SANDWICH, IL 60548
79727	C-W INDUSTRIES	550 DAVISVILLE RD.,P O BOX 96	WARMINISTER, PA 18974
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
80740	BECKMAN INSTRUMENTS, INC.	2500 HARBOR BLVD.	FULLERTON, CA 92634
81483	INTERNATIONAL RECTIFIER CORP.	9220 SUNSET BLVD.	LOS ANGELES, CA 90069
84411	TRW ELECTRONIC COMPONENTS, TRW CAPACITORS	112 W. FIRST ST.	OGALLALA, NE 69153
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E WASHINGTON STREET P O BOX 372	INDIANAPOLIS, IN 46206
91418	RADIO MATERIALS COMPANY, DIV. OF P.R. MALLORY AND COMPANY, INC.	4242 W BRYN MAWR	CHICAGO, IL 60646
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-1740-00			CKT BOARD ASSY:INPUT LOOP-THRU	80009	670-1740-00
A2	670-2609-04			CKT BOARD ASSY:VIDEO INPUT/SYNC	80009	670-2609-04
A3-1	670-2611-02	B010100	B020630	CKT BOARD ASSY:NTSC DECODER	80009	670-2611-02
	----- -----			* 670A ONLY		
A3-1	670-2611-04	B020631		CKT BOARD ASSY:NTSC DECODER	80009	670-2611-04
	----- -----			* 670A ONLY		
A3-2	670-3166-02	B010100	B020614	CKT BOARD ASSY:PAL DECODER	80009	670-3166-02
	----- -----			* 671A ONLY		
A3-2	670-3166-05	B020615	B020622	CKT BOARD ASSY:PAL DECODER	80009	670-3166-05
	----- -----			* 671A ONLY		
A3-2	670-3166-08	B020623		CKT BOARD ASSY:PAL DECODER	80009	670-3166-08
	----- -----			* 671A ONLY		
A4	670-2615-03			CKT BOARD ASSY:OUTPUT AMPLIFIER	80009	670-2615-03
A5	670-2612-08	B010100	B020409	CKT BOARD ASSY:DEFLECTION	80009	670-2612-08
	----- -----			* 670A ONLY		
A5	670-2612-09	B020410		CKT BOARD ASSY:DEFLECTION	80009	670-2612-09
	----- -----			* 670A ONLY		
A5-1	670-2612-07	B010100	B020409	CKT BOARD ASSY:DELFECTION	80009	670-2612-07
	----- -----			* 671A ONLY		
A5-1	670-2612-06	B020410		CKT BOARD ASSY:DEFLECTION	80009	670-2612-06
	----- -----			* 671A ONLY		
A6	670-2619-01	B010100	B029999	CKT BOARD ASSY:KINESCOPE SUPPLIED/BLANKING	80009	670-2619-01
A6	670-2619-03	B030000		CKT BOARD ASSY:KINESCOPE SUPPLIED/BLANKING	80009	670-2619-03
A7	119-0724-00			CKT BOARD ASSY:EHT SUPPLY	80009	119-0724-00
A8	670-3191-00			CKT BOARD ASSY:KINESCOPE (CRT) SOCKET	80009	670-3191-00
A9	670-2622-01			CKT BOARD ASSY:LV POWER SUPPLY	80009	670-2622-01
A10	670-2623-00			CKT BOARD ASSY:LV HEAT SINK	80009	670-2623-00
A11	670-2616-00			CKT BOARD ASSY:LEFT FRONT PANEL ASSY	80009	670-2616-00
A12	644-0049-04			PANEL ASY,R FR:	80009	644-0049-04
	----- -----			* 670A ONLY		
A12-1	644-0051-01			PANEL ASSY,R FR:	80009	644-0051-01
	----- -----			* 671A ONLY		
A13	670-3189-00			CKT BOARD ASSY:R-Y B-Y OUTPUT(OPTION 2)	80009	670-3189-00
A14	670-3455-00			CKT BOARD ASSY:PAL DECODER MATRIX	80009	670-3455-00
	----- -----			* 671A ONLY		
A15	670-3746-00			CKT BOARD ASSY:HV PHASING	80009	670-3746-00
A16	670-4568-00			CKT BOARD ASSY:APERTURE CORRECTOR	80009	670-4568-00
C102	281-0508-00			CAP.,FXD,CER DI:12PF,+/-0.6PF,500V	72982	301-000C0G0120J
C103	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C122	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C124	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D151E560F0
C125	283-0625-00			CAP.,FXD,MICA D:220PF,1%,500V	00853	D105F221F0
C126	281-0593-00			CAP.,FXD,CER DI:3.9PF,10%,500V	72982	301-000C0J0399C
C127	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D153F1130G0
C128	281-0593-00			CAP.,FXD,CER DI:3.9PF,10%,500V	72982	301-000C0J0399C
C129	283-0625-00			CAP.,FXD,MICA D:220PF,1%,500V	00853	D105F221F0
C135	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D151E560F0
C136	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C137	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C1007	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1015	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1017	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C1031	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1035	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C1045	283-0087-00			CAP.,FXD,CER DI:300PF,10%,1000V	56289	403637
C1111	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C1115	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C1151	283-0088-00			CAP.,FXD,CER DI:1100PF,5%,500V	56289	20C285
C1161	283-0078-00			CAP.,FXD,CER DI:0.001UF,20%,500V	56289	20C114A8
C1167	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C1183	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1185	283-0593-00			CAP.,FXD,MICA D:0.01UF,1%,100V	00853	D301F103F0
C1189	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C1193	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C1196	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C1201	290-0219-00			CAP.,FXD,ELCTLT:5UF,+75-10%,25V	56289	30D505G025BA9
C1205	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C1211	290-0164-00			CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C1215	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C1231	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C1241	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C1243	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1249	283-0618-00			CAP.,FXD,MICA D:130PF,2%,300V	00853	D155E131G0
C1253	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D151E560F0
C1275	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C1292	290-0215-00			CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C1293	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1295	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C1297	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C1305	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C1315	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C1329	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	274C10
C1341	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1357	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C1361	283-0593-00			CAP.,FXD,MICA D:0.01UF,1%,100V	00853	D301F103F0
C1373	283-0104-00	B010100	B020409	CAP.,FXD,CER DI:2000PF,5%,500V	72982	811-565B202J
C1373	283-0699-00	B020410		CAP.,FXD,MICA DI:100UF,+/-5%,500V	80009	283-0699-00
C1381	283-0627-00			CAP.,FXD,MICA D:0.0033UF,5%,500V	00853	D195E332J0
C1383	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C1401	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C1429	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1439	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1445	290-0219-00			CAP.,FXD,ELCTLT:5UF,+75-10%,25V	56289	30D505G025BA9
C1447	283-0620-00			CAP.,FXD,MICA D:470PF,1%,300V	00853	D153F471F0
C1463	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1485	283-0620-00			CAP.,FXD,MICA D:470PF,1%,300V	00853	D153F471F0
C1492	283-0150-00			CAP.,FXD,CER DI:650PF,5%,200V	72982	835-515B651J
C1511	283-0024-00			CAP.,FXD,CER DI:0.1UF,+80-20%,30V	72982	8121N083Z5U0104Z
C1535	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C1551	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C1555	283-0080-00			CAP.,FXD,CER DI:0.022UF,+80-20%,25V	56289	19C611
C1557	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C1561	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1569	290-0529-00			CAP.,FXD,ELCTLT:47UF,20%,20V	05397	T368C476M020AZ
C1577	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C1587	283-0084-00			CAP.,FXD,CER DI:270PF,5%,1000V	72982	838-533B271J
C1589	283-0080-00			CAP.,FXD,CER DI:0.022UF,+80-20%,25V	56289	19C611
C1595	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C1609	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1611	290-0219-00			CAP.,FXD,ELCTLT:5UF,+75-10%,25V	56289	30D505G025BA9
C1652	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1669	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1673	281-0504-00			CAP.,FXD,CER DI:10PF,+/-1PF,500V	72982	301-055C0G0100F
C1677	281-0513-00			CAP.,FXD,CER DI:27PF,+/-5.4PF,500V	72982	301-000P2G0270M
C1685	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1693	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C1713	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C1719	281-0592-00			CAP.,FXD,CER DI:4.7PF,+/-0.5PF,500V	72982	301-023C0H0479D
C1727	281-0573-00			CAP.,FXD,CER DI:11PF,10%	72982	301-000C0G0110K
C1733	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C1757	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1767	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1783	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
C1791	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C1796	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1801	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1805	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C1809	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C1837	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C1841	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C1855	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1859	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1877	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1905	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
C1909	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-035
C1919	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C1927	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C1937	281-0168-00			CAP.,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-035
C1939	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
C1949	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1967	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z
C1971	283-0629-00			CAP.,FXD,MICA D:62PF,1%,500V	00853	D105E620F0
C1979	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1981	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1989	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z
C1992	283-0629-00			CAP.,FXD,MICA D:62PF,1%,500V	00853	D105E620F0
C1999	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2003[1]	283-0620-00			CAP.,FXD,MICA D:470PF,1%,300V	00853	D153F471F0
C2005[1]	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2013[1]	283-0615-00			CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
C2023[1]	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C2103[1]	283-0028-00			CAP.,FXD,CER DI:0.0022UF,20%,50V	56289	19C606
C2109[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C2113[1]	283-0114-00			CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C2131[1]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C2133[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2161[1]	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C2165[1]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J

[1] 670A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C2173[1]	290-0107-00	B010100	B020630	CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C2173[1]	290-0745-00	B020631		CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C2191[1]	283-0116-00			CAP.,FXD,CER DI:820PF,5%,500V	72982	801-547B821J
C2225[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2227[1]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C2265[1]	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C2271[1]	283-0628-00			CAP.,FXD,MICA D:410PF,1%,500V	00853	D155F411F0
C2287[1]	283-0628-00			CAP.,FXD,MICA D:410PF,1%,500V	00853	D155F411F0
C2301[1]	283-0660-00			CAP.,FXD,MICA D:510PF,2%,500V	00853	D155F511G0
C2361[1]	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2377[1]	290-0287-00	B010100	B020630	CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C2377[1]	290-0770-00	B020631		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C2383[1]	290-0287-00	B010100	B020630	CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C2383[1]	290-0770-00	B020631		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C2385[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2387[1]	290-0287-00	B010100	B020630	CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C2387[1]	290-0770-00	B020631		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C2389[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2413[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2419[1]	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2433[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2437[1]	283-0638-00			CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
C2467[1]	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C2481[1]	283-0674-00			CAP.,FXD,MICA D:85PF,1%,500V	00853	D155F850F0
C2491[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2501[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2509[1]	283-0605-00			CAP.,FXD,MICA D:678PF,1%,300V	00853	D153F6780F0
C2511[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C2519[1]	283-0647-00			CAP.,FXD,MICA D:70PF,1%,100V	00853	D151E700F0
C2531[1]	283-0605-00			CAP.,FXD,MICA D:678PF,1%,300V	00853	D153F6780F0
C2533[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C2539[1]	283-0647-00			CAP.,FXD,MICA D:70PF,1%,100V	00853	D151E700F0
C2585[1]	283-0638-00			CAP.,FXD,MICA D:130PF,1%,100V	00853	D151F131F0
C2587[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C2601[1]	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2621[1]	281-0572-00	B010100	B020630	CAP.,FXD,CER DI:6.8PF,+/-0.5PF,500V	72982	301-000C0H0689D
C2621[1]	283-0260-00	B020631		CAP.,FXD,CER DI:5.6PF,5%,200V	72982	8111B200C0G569C
C2633[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2637[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2641[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2661[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C2687[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C2689[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C2707[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2715[1]	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C2733[1]	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z
C2751[1]	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C2759[1]	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z
C2789[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C2793[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2811[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C2829[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C2833[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C2891[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C2937[1]	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C2939[1]	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C2953[1]	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2961[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2975[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3006[2]	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C3008[2]	283-0028-00			CAP.,FXD,CER DI:0.0022UF,20%,50V	56289	19C606
C3010[2]	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C3012[2]	283-0615-00			CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
C3028[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3040[2]	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C3042[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3044[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3048[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3050[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3108[2]	283-0628-00			CAP.,FXD,MICA D:410PF,1%,500V	00853	D155F411F0
C3110[2]	283-0114-00			CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C3146[2]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C3150[2]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C3160[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3176[2]	283-0628-00			CAP.,FXD,MICA D:410PF,1%,500V	00853	D155F411F0
C3204[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3206[2]	283-0628-00			CAP.,FXD,MICA D:410PF,1%,500V	00853	D155F411F0
C3208[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3244[2]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C3250[2]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C3254[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3260[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3264[2]	283-0116-00			CAP.,FXD,CER DI:820PF,5%,500V	72982	801-547B821J
C3276[2]	283-0628-00			CAP.,FXD,MICA D:410PF,1%,500V	00853	D155F411F0
C3310[2]	281-0116-00			CAP.,VAR,AIR DI:1.6-9.1PF,425V	74970	189-0354-075
C3314[2]	281-0166-00			CAP.,VAR,AIR DI:1.9-15.7PF,250V	74970	187-0109-005
C3322[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3324[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3326[2]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C3334[2]	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C3336[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3339[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3346[2]	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C3382[2]	283-0644-00			CAP.,FXD,MICA D:150PF,1%,500V	00853	D151E151F0
C3384[2]	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C3398[2]	283-0000-00	B010100	B020614	CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C3398[2]	283-0065-00	B020615		CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C3480[2]	281-0153-00			CAP.,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-005
C3482[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3484[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3490[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3498[2]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3518[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3540[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3552[2]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3556[2]	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z

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[2] 671A ONLY.

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C3558[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3582[1]	290-0287-00	B010100	B020614	CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C3582[1]	290-0770-00	B020615		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C3584[1]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3586[1]	290-0287-00	B010100	B020614	CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C3586[1]	290-0770-00	B020615		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C3590[1]	290-0287-00	B010100	B020614	CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C3590[1]	290-0770-00	B020615		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C3608[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C3610[1]	283-0640-00			CAP.,FXD,MICA D:160PF,1%,100V	00853	D151E161F0
C3620[1]	283-0615-00			CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
C3628[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C3630[1]	283-0640-00			CAP.,FXD,MICA D:160PF,1%,100V	00853	D151E161F0
C3636[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3642[1]	283-0615-00			CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
C3644[1]	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0
C3650[1]	283-0640-00			CAP.,FXD,MICA D:160PF,1%,100V	00853	D151E161F0
C3654[1]	283-0615-00			CAP.,FXD,MICA D:33PF,5%,500V	00853	D155E330J0
C3676[1]	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C3692[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3694[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3696[1]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3702[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3730[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3738[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3754[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3780[1]	283-0647-00	B010100	B020614	CAP.,FXD,MICA D:70PF,1%,100V	00853	D151E700F0
C3780[1]	283-0644-00	B020615		CAP.,FXD,MICA D:150PF,1%,500V	00853	D151E151F0
C3782[1]	283-0004-00	B010100	B020614	CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C3782[1]	283-0644-00	B020615		CAP.,FXD,MICA D:150PF,1%,500V	00853	D151E151F0
C3796[1]	283-0602-00			CAP.,FXD,MICA D:53PF,5%,300V	00853	D153E530J0
C3814[1]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3826[1]	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z
C3846[1]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3852[1]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3860[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C3863[1]	283-0167-00	XB020615		CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3896[1]	283-0598-00			CAP.,FXD,MICA D:253PF,5%,300V	00853	D153E2530J0
C3920[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C3924[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C3934[1]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3940[1]	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C3948[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C3951[1]	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C3952[1]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C3954[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3956[1]	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z
C3966[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3986[1]	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3994[1]	283-0598-00			CAP.,FXD,MICA D:253PF,5%,300V	00853	D153E2530J0
C4031	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4061	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4171	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9

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C4173	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C4211	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4271	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C4301	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4311	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4321	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4323	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4341	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4353	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4361	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4371	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4403	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C4433	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C4463	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C4483	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4501	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C4507	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C4527	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4531	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C4537	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C4557	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4561	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C4567	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C4587	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4601	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4611	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4631	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4641	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4661	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4671	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C4701	290-0164-00			CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C4725	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C4731	290-0164-00			CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C4755	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C4761	290-0164-00			CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C4785	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C4805	283-0029-00			CAP.,FXD,CER DI:0.005UF,5%,500V	72982	821-000B502J
C4811	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	274C10
C4829	281-0627-00			CAP.,FXD,CER DI:1PF,+/-0.25PF,500V	72982	301-000C0K0109C
C4835	283-0029-00			CAP.,FXD,CER DI:0.005UF,5%,500V	72982	821-000B502J
C4841	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	274C10
C4859	281-0627-00			CAP.,FXD,CER DI:1PF,+/-0.25PF,500V	72982	301-000C0K0109C
C4865	283-0029-00			CAP.,FXD,CER DI:0.005UF,5%,500V	72982	821-000B502J
C4871	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	274C10
C4889	281-0627-00			CAP.,FXD,CER DI:1PF,+/-0.25PF,500V	72982	301-000C0K0109C
C4895	290-0149-00			CAP.,FXD,ELCTLT:5UF,+75-10%,150V	56289	30D505G150DD4
C5014	290-0149-00			CAP.,FXD,ELCTLT:5UF,+75-10%,150V	56289	30D505G150DD4
C5020	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5038	290-0162-00			CAP.,FXD,ELCTLT:22UF,20%,35V	12954	D22C35M1
C5046	285-0986-00			CAP.,FXD,PLSTC:0.82UF,5%,200V	84411	TEK158-824J2
C5060	285-1090-00			CAP.,FXD,PLSTC:0.01UF,5%,1600V	56289	715P103S16LA3
C5108	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C5109	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9

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C5109	290-0770-00	B020410		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C5110	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	274C10
C5115	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C5115	290-0770-00	B020410		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C5120	290-0287-00			CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C5200	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C5210	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C5218	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5222	283-0655-00			CAP.,FXD,MICA D:0.0033UF,1%,500V	00853	D195F332F0
C5225	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C5234	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C5240	285-1121-00			CAP.,FXD,PLSTC:0.47UF,5%,200V	84411	TEK-150-47452
C5250	285-1121-00			CAP.,FXD,PLSTC:0.47UF,5%,200V	84411	TEK-150-47452
C5260	285-1121-00			CAP.,FXD,PLSTC:0.47UF,5%,200V	84411	TEK-150-47452
C5267	290-0107-00	B010100	B020409	CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C5267	290-0782-00	B020410		CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	56289	503D475G035AS
C5268	290-0107-00	B010100	B020409	CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C5268	290-0782-00	B020410		CAP.,FXD,ELCTLT:4.7UF,+75-10%,35V	56289	503D475G035AS
C5272	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C5286	290-0287-00			CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C5288	285-0515-00			CAP.,FXD,PLSTC:0.022UF,20%,400V	56289	410P22304
C5304	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C5304	290-0770-00	B020410		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C5336	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C5338	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C5378	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C5406	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C5406	290-0770-00	B020410		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C5415	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C5422	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C5430	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5478	290-0290-00			CAP.,FXD,ELCTLT:10UF,20%,25V	56289	30D472
C5508	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C5510	283-0001-00			CAP.,FXD,CER DI:0.005UF,+100-0%,500V	72982	831-559E502P
C5512	283-0001-00			CAP.,FXD,CER DI:0.005UF,+100-0%,500V	72982	831-559E502P
C5514	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5516	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5520	283-0041-00			CAP.,FXD,CER DI:0.0033UF,5%,500V	72982	841-541B332J
C5522	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5562	283-0677-00			CAP.,FXD,MICA D:82PF,1%,500V	00853	D155E820F0
C5566	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C5570	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C5574	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C5576	290-0117-00			CAP.,FXD,ELCTLT:50UF,+75-10%,50V	56289	30D506G050DD9
C5578	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C5602	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C5602	290-0770-00	B020410		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C5604	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C5604	290-0770-00	B020410		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C5606	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C5606	290-0170-00	B020410		CAP.,FXD,ELCTLT:2 X 500UF,+100-10%,25V	56289	D40419-DFP
C5634	290-0219-00			CAP.,FXD,ELCTLT:5UF,+75-10%,25V	56289	30D505G025BA9
C5642	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15ED331F0

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C5645	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C5686	283-0114-00			CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C5688	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C5692	290-0519-00			CAP.,FXD,ELCTLT:100UF,20%,20V	56289	196D107X0020MA3
C5700	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C5700	290-0770-00	B020410		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C5702	290-0215-00	B010100	B020409	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C5702	290-0770-00	B020410		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C5718	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C5720	290-0248-01			CAP.,FXD,ELCTLT:150UF,20%,15V	56289	150D157X0015S2
C5743	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C5765	285-0698-00			CAP.,FXD,PLSTC:0.0082UF,5%,100V	56289	410P82251
C5770	283-0111-00	XB010248		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C5852	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C5858	285-0702-00			CAP.,FXD,PLSTC:0.033UF,5%,100V	56289	410P33351
C5860	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5862	283-0111-00	XB010248		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C5914	290-0149-00			CAP.,FXD,ELCTLT:5UF,+75-10%,150V	56289	30D505G150DD4
C5917	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5925	285-0703-00			CAP.,FXD,PLSTC:0.1UF,5%,100V	56289	410P10451
C5935	290-0164-00			CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C5940	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C5944	283-0268-00			CAP.,FXD,CER DI:0.015UF,10%,50V	72982	8121N083X7R0153K
C5945	283-0111-00	XB010248		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C5946	283-0111-00	XB010248		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C5956	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C5960	285-0683-00			CAP.,FXD,PLSTC:0.022UF,5%,100V	56289	410P22351
C5979	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5980	285-0703-00			CAP.,FXD,PLSTC:0.1UF,5%,100V	56289	410P10451
C5984	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C5986	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C6033	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C6034	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C6051	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039 E 105Z
C6062	290-0135-00			CAP.,FXD,ELCTLT:15UF,20%,20V	56289	150D156X0020B2
C6066	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C6070	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C6080	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C6100	285-0919-00			CAP.,FXD,PLSTC:0.22UF,10%,100V	56289	LP66A1B224K002
C6102	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C6104	283-0368-00			CAP.,FXD,CER DI:0.001UF,20%,12,000V	51406	DHR20Z5P102M12KV
	----- -----			(C6104 FURN AS A UNIT WITH 119-0724-00)		
C6106	283-0368-00			CAP.,FXD,CER DI:0.001UF,20%,12,000V	51406	DHR20Z5P102M12KV
	----- -----			(C6106 FURN AS A UNIT WITH 119-0724-00)		
C6110	283-0368-00			CAP.,FXD,CER DI:0.001UF,20%,12,000V	51406	DHR20Z5P102M12KV
	----- -----			(C6110 FURN AS A UNIT WITH 119-0724-00)		
C6150	290-0135-00			CAP.,FXD,ELCTLT:15UF,20%,20V	56289	150D156X0020B2
C6158	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N145X5R0104K
C6164	285-0905-00			CAP.,FXD,PLSTC:0.33UF,5%,50V	56289	LP66A1A334J002
C6166	283-0368-00			CAP.,FXD,CER DI:0.001UF,20%,12,000V	51406	DHR20Z5P102M12KV
	----- -----			(C6166 FURN AS A UNIT WITH 119-0724-00)		

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C6167	283-0368-00			CAP.,FXD,CER DI:0.001UF,20%,12,000V	51406	DHR20Z5P102M12KV
	----- -----			(C6167 FURN AS A UNIT WITH 119-0724-00)		
C6168	283-0368-00			CAP.,FXD,CER DI:0.001UF,20%,12,000V	51406	DHR20Z5P102M12KV
	----- -----			(C6168 FURN AS A UNIT WITH 119-0724-00)		
C6172	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039 E 105Z
C6182	283-0008-00			CAP.,FXD,CER DI:0.1UF,20%,500V	56289	275C8
	----- -----			(C6182 FURN AS A UNIT WITH 119-0724-00)		
C6185	283-0261-00			CAP.,FXD,CER DI:0.01UF,20%,4000V	56289	575C1A1
	----- -----			(C6185 FURN AS A UNIT WITH 119-0724-00)		
C6193	283-0008-00			CAP.,FXD,CER DI:0.1UF,20%,500V	56289	275C8
	----- -----			(C6193 FURN AS A UNIT WITH 119-0724-00)		
C6303	283-0004-00	B010100	B029999	CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C6303	283-0111-00	B030000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C6315	281-0501-00			CAP.,FXD,CER DI:4.7PF,(NOM VALUE),SEL	72982	301-000S2H0479F
	----- -----			* ADDED IF NECESSARY		
C6317	281-0501-00			CAP.,FXD,CER DI:4.7PF,(NOM VALUE),SEL	72982	301-000S2H0479F
	----- -----			* ADDED IF NECESSARY		
C6331	290-0442-00			CAP.,FXD,ELCTLT:120UF,+75-10%,150V	56289	39D127G150GL4
C6407	285-0629-00			CAP.,FXD,PLSTC:0.047UF,20%,100V	56289	410P47301
C6409	281-0662-00	XB020410		CAP.,FXD,CER DI:10PF,+/-0.5PF,500V	72982	301-000H3M0100D
C6409	----- -----			* ADDED IF NECESSARY		
C6410	281-0662-00	XB020410		CAP.,FXD,CER DI:10PF,+/-0.5PF,500V	72982	301-000H3M0100D
	----- -----			* ADDED IF NECESSARY		
C6413	285-0685-00			CAP.,FXD,PLSTC:0.0068UF,10%,100V	56289	410P107
C6449	283-0013-00			CAP.,FXD,CER DI:0.01UF,+100-0%,1000V	56289	33C29A7
C6451	290-0215-00	B010100	B029999	CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C6451	290-0770-00	B030000		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C6473	285-0506-00			CAP.,FXD,PLSTC:0.0047UF,20%,400V	56289	160P47204
C6475	290-0171-00	B010100	B029999	CAP.,FXD,ELCTLT:100UF,+75-10%,12VDC	56289	30D665
C6475	290-0770-00	B030000		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	56289	502D230
C6511	290-0107-00	B010100	B029999	CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C6511	290-0776-00	B030000	B030749	CAP.,FXD,ELCTLT:22UF,+50-10%,10V	0000L	ECE-A10V22L
C6511	290-0745-00	B030750		CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C6521	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C6541	290-0025-00			CAP.,FXD,ELCTLT:6.25UF,300V	37942	20-43851
C6543	290-0025-00			CAP.,FXD,ELCTLT:6.25UF,300V	37942	20-43851
C6561	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C6573	285-0506-00			CAP.,FXD,PLSTC:0.0047UF,20%,400V	56289	160P47204
C6575	283-0128-00			CAP.,FXD,CER DI:100PF,5%,500V	72982	871-536T2H101J
C6615	290-0107-00	B010100	B029999	CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C6615	290-0776-00	B030000	B030749	CAP.,FXD,ELCTLT:22UF,+50-10%,10V	0000L	ECE-A10V22L
C6615	290-0745-00	B030750		CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C6651	281-0613-00			CAP.,FXD,CER DI:10PF,+/-1PF,200V	72982	374001C0G100F
C6665	281-0613-00			CAP.,FXD,CER DI:10PF,+/-1PF,200V	72982	374001C0G100F
C6711	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C6723	283-0111-00	XB030000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C6725	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C6739	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C6741	283-0641-00			CAP.,FXD,MICA D:180PF,1%,100V	00853	D151E181F0
C6749	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P

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C6759	283-0013-00			CAP.,FXD,CER DI:0.01UF,+100-0%,1000V	56289	33C29A7
C6763	290-0519-00			CAP.,FXD,ELCTLT:100UF,20%,20V	56289	196D107X0020MA3
C6803	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C6809	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C6833	290-0164-00			CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C6843	283-0006-00			CAP.,FXD,CER DI:0.02UF,+80-20%,500V	72982	0841545Z5V00203Z
C6847	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C6849	283-0343-00	XB030000		CAP.,FXD,CER DI:0.01UF,20%,2000V	72982	3848545Z5U00103M
C6851	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	274C10
C6881	290-0107-00	B010100	B029999	CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C6881	290-0776-00	B030000	B030749	CAP.,FXD,ELCTLT:22UF,+50-10%,10V	0000L	ECE-A10V22L
C6881	290-0745-00	B030750		CAP.,FXD,ELCTLT:22UF,+50-10%,25V	56289	502D225
C6911	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C6931	283-0104-00			CAP.,FXD,CER DI:2000PF,5%,500V	72982	811-565B202J
C7101	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C7108	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C7309	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C7717	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C7723	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C7725	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C8005	283-0095-00			CAP.,FXD,CER DI:56PF,10%,200V	72982	855-535A560K
C8031	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
C8055	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C8057	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C8155	290-0107-00			CAP.,FXD,ELCTLT:25UF,+75-10%,25V	56289	30D256G025DB9
C8171	290-0405-00			CAP.,FXD,ELCTLT:10UF,+50-10%,150V	56289	30D106F150DD4
C8211	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C8241	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C8269	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C8383	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C8389	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C8411	290-0520-00			CAP.,FXD,ELCTLT:4500PF,+100-0%,40V	56289	68D10474
C8441	290-0520-00			CAP.,FXD,ELCTLT:4500PF,+100-0%,40V	56289	68D10474
C8487	281-0625-00			CAP.,FXD,CER DI:35PF,5%,500V	72982	308-000C0G0350J
C8493	290-0628-00			CAP.,FXD,ELCTLT:950UF,+50-10%,200V	56289	36D7560
C8565	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C8973	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C8983	283-0013-00			CAP.,FXD,CER DI:0.01UF,+100-0%,1000V	56289	33C29A7
C9007	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C9011	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
CR120	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR137	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1007	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1017	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR1033	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR1037	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1055	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1057	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1067	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1109	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1113	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1125	152-0401-00			SEMICOND DEVICE:SILICON,3-LAYER,TRIGGER	04713	1N5761
CR1129	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR1157	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1187	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1255	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1263	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1343	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1359	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1365	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1391	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1413	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1433	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1541	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1545	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1553	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1599	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1647	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1651	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1731	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1761	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1763	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1771	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1775	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1779	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1817	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1831	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1861	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1863	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1865	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1883	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1885	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1887	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1889	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1915	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1931	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1961	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1983	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1988	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2009[1]	152-0269-00	B010100	B029999	SEMICOND DEVICE:SILICON,VAR VCAP.,4V,33PF	80009	152-0269-00
CR2009[1]	152-0269-01	B030000		SEMICOND DEVICE:VVC,SI,33PF,5%,35V	80009	152-0269-01
CR2091[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2093[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2095[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2155[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2169[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2171[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2261[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2263[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2273[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2279[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2283[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2285[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2293[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2325[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2367[1]	152-0141-02	B010100	B020630X	SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02

[1] 670A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR2369[1]	152-0141-02	XB020631		SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2475[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2477[1]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR2978[1]	152-0322-00			SEMICOND DEVICE:SILICON,15V,HOT CARRIER	28480	5082-2672
CR3010[2]	152-0269-00	B010100	B029999	SEMICOND DEVICE:SILICON,VAR VCAP.,4V,33PF	80009	152-0269-00
CR3010[2]	152-0269-01	B030000		SEMICOND DEVICE:VVC,SI,33PF,5%,35V	80009	152-0269-01
CR3046[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3064[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3072[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3074[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3096[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3098[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3170[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3172[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3176[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3262[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3326[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3352[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3356[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3368[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3382[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3394[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3442[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3482[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3484[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3486[2]	152-0141-02	B010100	B020614X	SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3490[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3586[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3780[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3782[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR3951[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4106	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4221	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4231	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4261	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4313	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR4343	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4373	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4623	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4627	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4629	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4653	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4657	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4659	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4683	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4687	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4689	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4721	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4723	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4725	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4751	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4753	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4755	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02

[1] 670A ONLY.
[2] 671A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR4781	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4783	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4785	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR4825	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR4827	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR4855	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR4857	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR4885	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR4887	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR5020	152-0577-00			SEMICOND DEVICE:SILICON,1500V,3.5A	80009	152-0577-00
CR5021	152-0577-00			SEMICOND DEVICE:SILICON,1500V,3.5A	80009	152-0577-00
CR5120	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5217	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5236	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5237	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5238	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5264	152-0170-00			SEMICOND DEVICE:SILICON,1500V,10UA	80009	152-0170-00
CR5270	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR5274	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR5306	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5544	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5546	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5548	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5550	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5568	152-0040-00			SEMICOND DEVICE:SILICON,600V,1A	80009	152-0040-00
CR5570	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR5575	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5578	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5743	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5778	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5780	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5786	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5788	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5799	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5802	152-0040-00			SEMICOND DEVICE:SILICON,600V,1A	80009	152-0040-00
CR5805	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5806	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5807	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5866	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5868	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5880	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5889	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5894	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5896	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5898	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5916	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5970	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR5990	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6054	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6071	152-0586-00			SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J
CR6082	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6132	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	80009	152-0409-00
	----- -----			(CR6132 FURN AS A UNIT WITH 119-0724-00)		

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR6134	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	80009	152-0409-00
	----- -----			(CR6134 FURN AS A UNIT WITH 119-0724-00)		
CR6136	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	80009	152-0409-00
	----- -----			(CR6136 FURN AS A UNIT WITH 119-0724-00)		
CR6138	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	80009	152-0409-00
	----- -----			(CR6138 FURN AS A UNIT WITH 119-0724-00)		
CR6140	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	80009	152-0409-00
	----- -----			(CR6140 FURN AS A UNIT WITH 119-0724-00)		
CR6142	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	80009	152-0409-00
	----- -----			(CR6142 FURN AS A UNIT WITH 119-0724-00)		
CR6152	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6154	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6181	152-0586-00			SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J
	----- -----			(CR6181 FURN AS A UNIT WITH 119-0724-00)		
CR6194	152-0586-00			SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J
	----- -----			(CR6194 FURN AS A UNIT WITH 119-0724-00)		
CR6453	152-0170-00			SEMICOND DEVICE:SILICON,1500V,10UA	80009	152-0170-00
CR6475	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR6511	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6617	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6633	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6639	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6641	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6731	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6735	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6751	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6753	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6755	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6805	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6807	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6813	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6827	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6883	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR6901	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6905	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6915	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR6919	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR7613	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR7715	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR8091	152-0040-00			SEMICOND DEVICE:SILICON,600V,1A	80009	152-0040-00
CR8093	152-0040-00			SEMICOND DEVICE:SILICON,600V,1A	80009	152-0040-00
CR8095	152-0040-00			SEMICOND DEVICE:SILICON,600V,1A	80009	152-0040-00
CR8103	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR8183	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR8373	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR8387	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR8421	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR8511	152-0406-00			SEMICOND DEVICE:SILICON,200V,3A	80009	152-0406-00
CR8541	152-0406-00			SEMICOND DEVICE:SILICON,200V,3A	80009	152-0406-00
CR8563	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR8581	152-0406-00			SEMICOND DEVICE:SILICON,200V,3A	80009	152-0406-00
CR8805	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
DL3480	119-0360-00			DELAY LINE,ELEC:	25403	DL50
DL3480	119-0416-00			DELAY LINE,ELEC:	73445	DL53
DS6070	150-0050-00			LAMP,GLOW:	74276	LT2-24-2(NE2H)
DS6079	150-0050-00			LAMP,GLOW:	74276	LT2-24-2(NE2H)
DS6130	150-0050-00			LAMP,GLOW:	74276	LT2-24-2(NE2H)
DS7705	150-0121-00			LAMP,CARTRIDGE:5V,60MA,WHITE	55292	71320-01
DS7901	150-0121-01			LAMP,CARTRIDGE:5V,60MA,YELLOW	55292	71320-02
DS7903	150-0121-01			LAMP,CARTRIDGE:5V,60MA,YELLOW	55292	71320-02
DS8863	150-0030-00			LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS9007	150-0059-00			LAMP,INCAND:14V,0.08A	08806	386
DS9011	150-0059-00			LAMP,INCAND:14V,0.08A	08806	386
E6186	119-0445-00			ARSR,ELEC SURGE:2.5KV,+/-20%	25088	B2H25
	----- -----			(E6186 FURN AS A UNIT WITH 119-0724-00)		
E6205	119-0284-00			ARSR,ELEC SURGE:1.5KV,+/-500VD	91418	SCOR75Y52-IR0
E6207	119-0284-00			ARSR,ELEC SURGE:1.5KV,+/-500VD	91418	SCOR75Y52-IR0
E6209	119-0284-00			ARSR,ELEC SURGE:1.5KV,+/-500VD	91418	SCOR75Y52-IR0
E6243	119-0284-00			ARSR,ELEC SURGE:1.5KV,+/-500VD	91418	SCOR75Y52-IR0
E6245	119-0284-00			ARSR,ELEC SURGE:1.5KV,+/-500VD	91418	SCOR75Y52-IR0
E6247	119-0284-00			ARSR,ELEC SURGE:1.5KV,+/-500VD	91418	SCOR75Y52-IR0
E6249	119-0284-00			ARSR,ELEC SURGE:1.5KV,+/-500VD	91418	SCOR75Y52-IR0
F5042	159-0028-00			FUSE,CARTRIDGE:3AG,0.25A,250V,FAST-BLOW	71400	AGC 1/4
F8825	159-0022-00			FUSE,CARTRIDGE:3AG,1A,250V,FAST-BLOW	71400	AGC 1
F8851	159-0022-00			FUSE,CARTRIDGE:3AG,1A,250V,FAST-BLOW	71400	AGC 1
F8987	159-0015-00			FUSE,CARTRIDGE:3AG,3A,250V,FAST-BLOW	71400	AGC 3
L126	108-0687-00			TRANSFORMER,RF:25UH	80009	108-0687-00
L128	108-0687-00			TRANSFORMER,RF:25UH	80009	108-0687-00
L2201[1]	108-0317-00			COIL,RF:FIXED,15UH	32159	71501M
L2203[1]	108-0231-00			COIL,RF:4.5UH	80009	108-0231-00
L2205[1]	114-0222-00			COIL,RF:2-6UH,CORE 276-0568-00	80009	114-0222-00
L2507[1]	114-0311-00			COIL,RF:65-190UH,CORE 276-0568-00	80009	114-0311-00
L2513[1]	114-0310-00			COIL,RF:22-80UH	80009	114-0310-00
L2529[1]	114-0311-00			COIL,RF:65-190UH,CORE 276-0568-00	80009	114-0311-00
L2535[1]	114-0310-00			COIL,RF:22-80UH	80009	114-0310-00
L2551[1]	108-0317-00			COIL,RF:FIXED,15UH	32159	71501M
L2581[1]	114-0303-00			COIL,RF:6.5-23UH,CORE 276-0506-00	80009	114-0303-00
L2583[1]	108-0803-00			COIL,RF:30UH	80009	108-0803-00
L2655[1]	114-0280-00			COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00
L2677[1]	108-0317-00			COIL,RF:FIXED,15UH	32159	71501M
L2683[1]	108-0803-00			COIL,RF:30UH	80009	108-0803-00
L2685[1]	108-0803-00			COIL,RF:30UH	80009	108-0803-00
L2787[1]	108-0803-00			COIL,RF:30UH	80009	108-0803-00
L2887[1]	108-0803-00			COIL,RF:30UH	80009	108-0803-00
L3102[2]	108-0317-00			COIL,RF:FIXED,15UH	32159	71501M
L3104[2]	108-0231-00			COIL,RF:4.5UH	80009	108-0231-00
L3110[2]	114-0222-00			COIL,RF:2-6UH,CORE 276-0568-00	80009	114-0222-00
L3380[2]	114-0280-00	B010100	B020614	COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00
L3380[2]	114-0278-00	B020615		COIL,RF:4.6-16.7UH,CORE 276-0568-00	80009	114-0278-00
L3480[2]	114-0280-00	B010100	B020614	COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00
L3480[2]	114-0278-00	B020615		COIL,RF:4.6-16.7UH,CORE 276-0568-00	80009	114-0278-00
L3608[2]	114-0310-00			COIL,RF:22-80UH	80009	114-0310-00
L3610[2]	114-0280-00			COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00

[1] 670A ONLY.
[2] 671A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
L3630 [1]	114-0310-00			COIL,RF:22-80UH	80009	114-0310-00
L3640 [1]	114-0280-00			COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00
L3644 [1]	114-0310-00			COIL,RF:22-80UH	80009	114-0310-00
L3650 [1]	114-0280-00			COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00
L3770 [1]	114-0280-00			COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00
L3790 [1]	114-0280-00			COIL,RF:12-43UH,CORE 276-0568-00	80009	114-0280-00
L3890 [1]	108-0687-00			TRANSFORMER,RF:25UH	80009	108-0687-00
L3990 [1]	108-0687-00			TRANSFORMER,RF:25UH	80009	108-0687-00
L3992 [1]	108-0687-00			TRANSFORMER,RF:25UH	80009	108-0687-00
	----- -----			* WIRE STRAP		
L3994 [1]	108-0317-00			COIL,RF:FIXED,15UH	32159	71501M
L5044	----- -----			* FURNISHED AS A UNIT WITH 119-0591-01		
L5085	108-0813-00			COIL,RF:10UH	80009	108-0813-00
L5208	108-0114-00			COIL,RF:6UH	80009	108-0114-00
L5250	----- -----			* FURNISHED AS A UNIT WITH 119-0591-01		
L5390	108-0688-00			COIL,RF:3.5MH	80009	108-0688-00
L5400	----- -----			* FURNISHED AS A UNIT WITH 119-0591-01		
L5450	----- -----			* FURNISHED AS A UNIT WITH 119-0591-01		
L5614	108-0783-00			COIL,RF:10MH	80009	108-0783-00
L5900	----- -----			* FURNISHED AS A UNIT WITH 119-0590-01		
L5933	----- -----			* FURNISHED AS A UNIT WITH 119-0591-01		
L5950	----- -----			* FURNISHED AS A UNIT WITH 119-0590-01		
L6455	108-0336-00			COIL,RF:100UH	80009	108-0336-00
L8985	108-0781-00			COIL,RF:DEGAUSSING	80009	108-0781-00
LR1303	108-0111-00			COIL,RF:5.5UH	80009	108-0111-00
LR3040	108-0368-00			COIL,RF:10UH	80009	108-0368-00
	----- -----			* 671A ONLY		
P6675	131-0589-00			TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
Q128	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q129	151-1025-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	80009	151-1025-00
Q142	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q144	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q146	151-0216-00			TRANSISTOR:SILICON,PNP	80009	151-0216-00
Q1015	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1047	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1111	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1155	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1171	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1179	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1181	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1189	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1239	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1251	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1271	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1281	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1283	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1311	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1347	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1355	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1369	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1375	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1379	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649

[1] 671A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q1387	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1389	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q1407	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1421	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1443	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1459	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1465	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1471	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1472	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1473	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q1474	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1483	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1486	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1487	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1497	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q1529	151-1012-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1012-00
Q1539	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1549	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1556	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1559	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1567	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1571	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1582	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1593	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q1613	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1629	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1643	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1659	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1663	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1665	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1679	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1681	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q1735	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q1759	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1792	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1793	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1807	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1811	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q1813	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q1829	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1833	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q1835	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1843	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1873	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1889	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1891	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1895	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1907	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1941	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1969	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1988	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1991	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2083[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00

[1] 670A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q2085[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2087[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2105[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q2111[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q2135[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q2141[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q2155[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q2177[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2183[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2233[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q2251[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2253[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2257[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2269[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q2289[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q2351[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2367[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2375[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2451[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q2453[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q2459[1]	151-0434-00			TRANSISTOR:SILICON,PNP	80009	151-0434-00
Q2467[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2485[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2601[1]	151-0301-00	XB020631		TRANSISTOR:SILICON,PNP	04713	2N2907A
Q2605[1]	151-0301-00	B010100	B020630X	TRANSISTOR:SILICON,PNP	04713	2N2907A
Q2613[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2615[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2623[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2625[1]	151-0458-00	B010100	B020630	TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q2625[1]	151-0459-00	B020631		TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2651[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2653[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2655[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2713[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q2717[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2721[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2735[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q2745[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q2779[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q2785[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2861[1]	151-1026-00			TRANSISTOR:FET,N-CHAN,SI	80009	151-1026-00
Q2863[1]	151-0367-00			TRANSISTOR:SILICON,NPN,SEL FROM 3571TP	80009	151-0367-00
Q2875[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q2915[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q2919[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q2925[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q2979[1]	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q3010[2]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q3072[2]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q3074[2]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q3090[2]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3092[2]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3094[2]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00

[1] 670A ONLY.
[2] 671A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q3104[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q3140[1]	151-0508-00			TRANSISTOR:SILICON,NPN,PROGRAMMABLE	03508	2N6027
Q3142[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3146[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3150[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3210[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q3212[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q3216[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3218[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3230[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3232[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q3234[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3236[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q3270[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q3290[1]	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q3340[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q3342[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q3344[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3350[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3368[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3434[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3440[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3444[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3446[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3482[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3578[1]	151-0460-00			TRANSISTOR:SILICON,NPN	80009	151-0460-00
Q3580[1]	151-0460-00			TRANSISTOR:SILICON,NPN	80009	151-0460-00
Q3582[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q3584[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3590[1]	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q3592[1]	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q3668[1]	151-0302-00	XB020615		TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3674[1]	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q3680[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3682[1]	151-0434-00	B010100	B020614	TRANSISTOR:SILICON,PNP	80009	151-0434-00
Q3682[1]	151-0438-00	B020615		TRANSISTOR:SILICON,PNP,SEL FROM SPS6927	80009	151-0438-00
Q3684[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3694[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3710[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3712[1]	151-0458-00			TRANSISTOR:SILICON,PNP	80009	151-0458-00
Q3714[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3720[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3722[1]	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q3724[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3733	151-0301-00	B010100	B020614X	TRANSISTOR:SILICON,PNP	04713	2N2907A
Q3742[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3744[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3746[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3750[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3752[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3754[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3819[1]	151-1015-00	B010100	B020614X	TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3820[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q3824[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3843[1]	151-0302-00	B010100	B020614	TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3843[1]	151-0190-00	B020615		TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q3850[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3852[1]	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3862[1]	151-0367-00			TRANSISTOR:SILICON,NPN,SEL FROM 3571TP	80009	151-0367-00
Q3864[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q3865[1]	151-0457-00	XB020615		TRANSISTOR:SILICON,NPN	07263	S39649
Q3866[1]	151-1026-00			TRANSISTOR:FET,N-CHAN,SI	80009	151-1026-00
Q3868[1]	151-0457-00	B010100	B020614X	TRANSISTOR:SILICON,NPN	07263	S39649
Q3917[1]	151-1015-00	B010100	B020614X	TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3919[1]	151-1015-00	B010100	B020614X	TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q3980[1]	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q3984[1]	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4205	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4225	151-0457-00			TRANSISTOR:SILICON,NPN	07263	S39649
Q4235	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4265	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4315	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4375	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4417	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4445	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4447	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4475	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4477	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4503	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q4515	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4517	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4533	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q4545	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4547	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4563	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q4575	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4577	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q4713	151-0274-00			TRANSISTOR:SILICON,NPN	80009	151-0274-00
Q4715	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4717	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4743	151-0274-00			TRANSISTOR:SILICON,NPN	80009	151-0274-00
Q4745	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4747	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4773	151-0274-00			TRANSISTOR:SILICON,NPN	80009	151-0274-00
Q4775	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4777	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q4813	151-0270-00			TRANSISTOR:SILICON,PNP	80009	151-0270-00
Q4843	151-0270-00			TRANSISTOR:SILICON,PNP	80009	151-0270-00
Q4873	151-0270-00			TRANSISTOR:SILICON,PNP	80009	151-0270-00
Q5000	151-0358-00			TRANSISTOR:SILICON,NPN,SEL FROM D44R4	80009	151-0358-00
Q5001	151-0368-00			TRANSISTOR:SILICON,NPN	80009	151-0368-00
Q5004	151-0280-00			TRANSISTOR:SILICON,PNP	80009	151-0280-00
Q5020	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5026	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q5030	151-0449-00			TRANSISTOR:SILICON,NPN	80009	151-0449-00
Q5100	151-0352-00	B010100	B010247	TRANSISTOR:SILICON,NPN	80009	151-0352-00

[1] 671A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q5100	151-0426-00	B010248		TRANSISTOR:SILICON,NPN	80009	151-0426-00
Q5118	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5124	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5126	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q5136	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5198	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5200	151-0352-00	B010100	B010247	TRANSISTOR:SILICON,NPN	80009	151-0352-00
Q5200	151-0426-00	B010248		TRANSISTOR:SILICON,NPN	80009	151-0426-00
Q5206	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5212	151-0134-00			TRANSISTOR:SILICON,PNP	80009	151-0134-00
Q5225	151-0103-00			TRANSISTOR:SILICON,NPN	80009	151-0103-00
Q5275	151-0364-00			TRANSISTOR:SILICON,PNP	80009	151-0364-00
Q5280	151-0352-00			TRANSISTOR:SILICON,NPN	80009	151-0352-00
Q5300	151-0364-00			TRANSISTOR:SILICON,PNP	80009	151-0364-00
Q5315	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5400	151-0352-00			TRANSISTOR:SILICON,NPN	80009	151-0352-00
Q5410	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5415	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q5416	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q5424	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5426	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5440	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5506	151-0364-00			TRANSISTOR:SILICON,PNP	80009	151-0364-00
Q5508	151-0352-00			TRANSISTOR:SILICON,NPN	80009	151-0352-00
Q5556	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5585	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5586	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5640	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5648	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5656	151-0364-00			TRANSISTOR:SILICON,PNP	80009	151-0364-00
Q5658	151-0352-00			TRANSISTOR:SILICON,NPN	80009	151-0352-00
Q5700	151-0358-00			TRANSISTOR:SILICON,NPN,SEL FROM D44R4	80009	151-0358-00
Q5715	151-0406-00			TRANSISTOR:SILICON,PNP	80009	151-0406-00
Q5718	151-0150-00			TRANSISTOR:SILICON,NPN	80009	151-0150-00
Q5730	151-0150-00			TRANSISTOR:SILICON,NPN	80009	151-0150-00
Q5740	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5760	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5768	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5784	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5786	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5788	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5800	151-0358-00			TRANSISTOR:SILICON,NPN,SEL FROM D44R4	80009	151-0358-00
Q5815	151-0150-00			TRANSISTOR:SILICON,NPN	80009	151-0150-00
Q5840	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5890	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5894	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5900	151-0423-00			TRANSISTOR:SILICON,NPN	80009	151-0423-00
Q5905	151-0280-00			TRANSISTOR:SILICON,PNP	80009	151-0280-00
Q5915	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q5948	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q5950	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q5952	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q5963	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00

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Q5964	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5970	151-1015-00			TRANSISTOR:SILICON,FE,N-CHANNEL	80009	151-1015-00
Q5972	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5984	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q5988	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q5990	151-0508-00			TRANSISTOR:SILICON,NPN,PROGRAMMABLE	03508	2N6027
Q5995	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q6092	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q6170	151-0183-00			TRANSISTOR:SILICON,NPN	80009	151-0183-00
Q6190	151-0183-00			TRANSISTOR:SILICON,NPN	80009	151-0183-00
Q6461	151-0390-00			TRANSISTOR:SILICON,NPN	80009	151-0390-00
Q6477	151-0256-00			TRANSISTOR:SILICON,NPN	80009	151-0256-00
Q6481	151-0352-00			TRANSISTOR:SILICON,NPN	80009	151-0352-00
Q6653	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q6663	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q6679	151-0256-00			TRANSISTOR:SILICON,NPN	80009	151-0256-00
Q6733	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q6737	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q6747	151-0423-00			TRANSISTOR:SILICON,NPN	80009	151-0423-00
Q6771	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q6821	151-0459-00			TRANSISTOR:SILICON,PNP	80009	151-0459-00
Q6825	151-0407-00			TRANSISTOR:SILICON,NPN	80009	151-0407-00
Q6837	151-0406-00			TRANSISTOR:SILICON,PNP	80009	151-0406-00
Q6923	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q6935	151-0423-00			TRANSISTOR:SILICON,NPN	80009	151-0423-00
Q7617	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q7813	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q8283	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q8381	151-0280-00			TRANSISTOR:SILICON,PNP	80009	151-0280-00
Q8481A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q8483	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q8567	151-0514-00			TRANSISTOR:SILICON,SCR	02735	2N3528
Q8801	151-0337-00			TRANSISTOR:SILICON,NPN	80009	151-0337-00
Q8821	151-0335-00			TRANSISTOR:SILICON,PNP	80009	151-0335-00
Q8831	151-0405-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE800	80009	151-0405-00
Q8841	151-0405-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE800	80009	151-0405-00
Q8861	151-0311-01			TRANSISTOR:SILICON,NPN	80009	151-0311-01
Q8881	151-0335-00			TRANSISTOR:SILICON,PNP	80009	151-0335-00
Q8891	151-0337-00			TRANSISTOR:SILICON,NPN	80009	151-0337-00
Q8929	151-0315-00			TRANSISTOR:SILICON,NPN	80009	151-0315-00
R120	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
R122	321-0275-00			RES.,FXD,FILM:7.15K OHM,1%,0.125W	91637	MFF1816G71500F
R124	321-0137-00			RES.,FXD,FILM:261 OHM,1%,0.125W	91637	MFF1816G261R0F
R127	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R130	321-0269-00			RES.,FXD,FILM:6.19K OHM,1%,0.125W	91637	MFF1816G61900F
R131	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R132	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R134	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
R135	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
R136	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R138	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
R140	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R142	321-0413-00			RES.,FXD,FILM:196K OHM,1%,0.125W	91637	MFF1816G19602F

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R144	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499ROF
R145	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499ROF
R146	321-0137-00			RES.,FXD,FILM:261 OHM,1%,0.125W	91637	MFF1816G261ROF
R147	315-0394-00			RES.,FXD,CMPSN:390K OHM,5%,0.25W	01121	CB3945
R148	311-1245-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	72-28-0
R150	323-0246-00			RES.,FXD,FILM:3.57K OHM,1%,0.50W	75042	CECT0-3571F
R1013	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1017	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1019	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1021	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1023	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1027	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1031	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1033	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1039	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1041	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1043	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1052	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1053	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1059	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1061	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R1063	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
R1065	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1071	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1073	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R1077	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R1103	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1105	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1107	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1109	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1113	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R1125	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1131	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1133	321-0379-00			RES.,FXD,FILM:86.6K OHM,1%,0.125W	91637	MFF1816G86601F
R1135	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R1139	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R1153	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R1159	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R1163	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R1165	315-0184-00			RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R1169	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R1185	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R1186	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R1187	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R1191	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R1193	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R1195	321-0279-00			RES.,FXD,FILM:7.87K OHM,1%,0.125W	91637	MFF1816G78700F
R1197	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
R1198	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1199	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1207	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1213	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1217	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

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R1219	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1229	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1233	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1235	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1237	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1245	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R1247	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R1257	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1259	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1261	321-0281-00			RES.,FXD,FILM:8.25K OHM,1%,0.125W	91637	MFF1816G82500F
R1265	321-0403-00			RES.,FXD,FILM:154K OHM,1%,0.125W	91637	MFF1816G15402F
R1267	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R1269	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R1273	321-0301-00			RES.,FXD,FILM:13.3K OHM,1%,0.125W	91637	MFF1816G13301F
R1277	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1279	321-0335-00			RES.,FXD,FILM:30.1K OHM,(NOM VALUE),SEL	91637	MFF1816G30101F
R1287	316-0126-00			RES.,FXD,CMPSN:12M OHM,10%,0.25W	01121	CB1261
R1288	321-0252-00			RES.,FXD,FILM:4.12K OHM,1%,0.125W	91637	MFF1816G41200F
R1289	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R1291	321-0180-00			RES.,FXD,FILM:732 OHM,1%,0.125W	91637	MFF1816G732R0F
R1292	321-0172-00			RES.,FXD,FILM:604 OHM,1%,0.125W	91637	MFF1816G604R0F
R1294	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R1296	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R1297	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1299	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R1307	301-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.50W	01121	EB7535
R1309	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1319	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1321	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1323	321-0256-00			RES.,FXD,FILM:4.53K OHM,1%,0.125W	91637	MFF1816G45300F
R1325	323-0343-00			RES.,FXD,FILM:36.5K OHM,1%,0.50W	91637	MFF1226G36501F
R1327	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R1331	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1335	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R1337	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R1339	316-0126-00			RES.,FXD,CMPSN:12M OHM,10%,0.25W	01121	CB1261
R1349	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R1351	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1353	321-0229-00			RES.,FXD,FILM:2.37K OHM,1%,0.125W	91637	MFF1816G23700F
R1363	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1367	321-0296-00			RES.,FXD,FILM:11.8K OHM,1%,0.125W	91637	MFF1816G11801F
R1377	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1385	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1393	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1395	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R1398	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1403	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R1405	321-0153-00			RES.,FXD,FILM:383 OHM,1%,0.125W	91637	MFF1816G383R0F
R1409	311-1225-00			RES.,VAR,NONWIR:1K OHM,20%,0.50W	32997	3386F-T04-102
R1411	321-0184-00			RES.,FXD,FILM:806 OHM,1%,0.125W	91637	MFF1816G806R0F
R1417	321-0213-00			RES.,FXD,FILM:1.62K OHM,1%,0.125W	91637	MFF1816G16200F
R1419	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1427	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015

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R1431	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1435	315-0155-00			RES.,FXD,CMPSN:1.5M OHM,5%,0.25W	01121	CB1555
R1437	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R1441	321-0257-00			RES.,FXD,FILM:4.64K OHM,1%,0.125W	91637	MFF1816G46400F
R1449	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R1451	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1453	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R1455	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1461	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R1467	315-0274-00			RES.,FXD,CMPSN:270K OHM,5%,0.25W	01121	CB2745
R1469	315-0914-00			RES.,FXD,CMPSN:910K OHM,5%,0.25W	01121	CB9145
R1475	315-0274-00			RES.,FXD,CMPSN:270K OHM,5%,0.25W	01121	CB2745
R1477	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R1479	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R1481	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R1484	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1488	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1489	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R1491	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1493	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1495	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1496	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1503	321-0347-00			RES.,FXD,FILM:40.2K OHM,1%,0.125W	91637	MFF1816G40201F
R1507	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1509	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499R0F
R1513	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R1515	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1527	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1533	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R1543	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R1547	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R1552	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1554	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1563	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
R1565	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1573	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R1575	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1578	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R1581	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1583	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1585	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1591	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1594	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R1597	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R1599	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1601	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R1603	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
R1605	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R1607	321-0269-00			RES.,FXD,FILM:6.19K OHM,1%,0.125W	91637	MFF1816G61900F
R1615	321-0108-00			RES.,FXD,FILM:130 OHM,1%,0.125W	91637	MFF1816G130R0F
R1619	321-0108-00			RES.,FXD,FILM:130 OHM,1%,0.125W	91637	MFF1816G130R0F
R1621	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
R1627	321-0209-00			RES.,FXD,FILM:1.47K OHM,1%,0.125W	91637	MFF1816G14700F

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R1633	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R1635	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R1637	321-0242-00			RES.,FXD,FILM:3.24K OHM,1%,0.125W	91637	MFF1816G32400F
R1639	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R1641	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R1645	315-0361-00			RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R1649	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R1653	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R1654	315-0113-00			RES.,FXD,CMPSN:11K OHM,5%,0.25W	01121	CB1135
R1656	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R1661	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1667	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1673	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R1675	321-0261-00			RES.,FXD,FILM:5.11K OHM,1%,0.125W	91637	MFF1816G51100F
R1683	321-0325-00			RES.,FXD,FILM:23.7K OHM,1%,0.125W	91637	MFF1816G23701F
R1687	321-0319-00			RES.,FXD,FILM:20.5K OHM,1%,0.125W	91637	MFF1816G20501F
R1689	315-0824-00			RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R1691	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R1695	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1698	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1701	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R1703	321-0774-03			RES.,FXD,FILM:4.5K OHM,0.25%,0.125W	91637	MFF1816D45000C
R1707	321-0326-00			RES.,FXD,FILM:24.3K OHM,1%,0.125W	91637	MFF1816G24301F
R1709	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1711	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1713	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R1715	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R1721	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R1729	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1741	301-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.50W	01121	EB3035
R1743	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R1747	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R1755	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R1765	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1773	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R1777	321-0247-00			RES.,FXD,FILM:3.65K OHM,1%,0.125W	91637	MFF1816G36500F
R1781	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1785	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1787	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1788	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1789	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1794	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R1795	321-0302-00			RES.,FXD,FILM:13.7K OHM,1%,0.125W	91637	MFF1816G13701F
R1797	321-0331-00			RES.,FXD,FILM:27.4K OHM,1%,0.125W	91637	MFF1816G27401F
R1803	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R1815	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1827	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1839	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R1845	321-0774-03			RES.,FXD,FILM:4.5K OHM,0.25%,0.125W	91637	MFF1816D45000C
R1857	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1867	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1869	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1871	321-0254-00			RES.,FXD,FILM:4.32K OHM,1%,0.125W	91637	MFF1816G43200F

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R1875	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R1879	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1881	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1893	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1897	321-0254-00			RES.,FXD,FILM:4.32K OHM,1%,0.125W	91637	MFF1816G43200F
R1901	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1903	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1913	321-0603-00			RES.,FXD,FILM:15K OHM,0.25%,0.125W	91637	MFF1816D15001C
R1917	321-0385-00			RES.,FXD,FILM:100K OHM,1%,0.125W	91637	MFF1816G10002F
R1929	321-0385-00			RES.,FXD,FILM:100K OHM,1%,0.125W	91637	MFF1816G10002F
R1933	321-0603-00			RES.,FXD,FILM:15K OHM,0.25%,0.125W	91637	MFF1816D15001C
R1943	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1945	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1947	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R1965	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R1973	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1975	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R1977	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1987	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R1988	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R1993	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1995	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1997	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R2001[1]	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R2007[1]	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R2011[1]	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R2015[1]	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R2017[1]	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R2019[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2021[1]	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R2025[1]	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R2027[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2029[1]	315-0475-00			RES.,FXD,CMPSN:4.7M OHM,5%,0.25W	01121	CB4755
R2031[1]	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R2035[1]	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R2037[1]	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R2039[1]	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R2040[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2052[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2055[1]	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R2057[1]	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
R2059[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2061[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2065[1]	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R2067[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2069[1]	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R2071[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2073[1]	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R2075[1]	315-0361-00			RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R2077[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2079[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2081[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2101[1]	315-0750-00			RES.,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505

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R2107[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2125[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2127[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2129[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R2137[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2151[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2153[1]	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R2157[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2159[1]	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R2163[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2167[1]	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R2175[1]	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R2179[1]	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R2185[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2187[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2227[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2231[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R2235[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2237[1]	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R2259[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2277[1]	321-0349-00			RES.,FXD,FILM:42.2K OHM,1%,0.125W	91637	MFF1816G42201F
R2281[1]	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R2289[1]	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R2291[1]	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R2295[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R2303[1]	321-0093-00			RES.,FXD,FILM:90.9 OHM,1%,0.125W	91637	MFF1816G90R90F
R2327[1]	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R2329[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2335[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R2355[1]	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R2357[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2359[1]	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R2363[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2365[1]	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R2369[1]	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R2373[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2379[1]	321-0336-00			RES.,FXD,FILM:30.9 OHM,1%,0.125W	91637	MFF1816G30901F
R2381[1]	321-0287-00			RES.,FXD,FILM:9.53K OHM,1%,0.125W	91637	MFF1816G95300F
R2401[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2403[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2407[1]	311-1260-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	32997	3329P-L58-251
R2409[1]	321-0207-00			RES.,FXD,FILM:1.4K OHM,1%,0.125W	91637	MFF1816G14000F
R2411[1]	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R2415[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2417[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2427[1]	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R2429[1]	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R2431[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R2435[1]	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499R0F
R2439[1]	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R2441[1]	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R2455[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2457[1]	315-0113-00			RES.,FXD,CMPSN:11K OHM,5%,0.25W	01121	CB1135

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R2465[1]	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R2469[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2483[1]	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2489[1]	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
R2503[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2505[1]	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R2515[1]	321-0175-00			RES.,FXD,FILM:649 OHM,1%,0.125W	91637	MFF1816G649R0F
R2517[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2525[1]	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R2527[1]	321-0162-00			RES.,FXD,FILM:475 OHM,1%,0.125W	91637	MFF1816G475R0F
R2537[1]	321-0162-00			RES.,FXD,FILM:475 OHM,1%,0.125W	91637	MFF1816G475R0F
R2541[1]	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R2553[1]	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R2575[1]	321-0275-00			RES.,FXD,FILM:7.15K OHM,1%,0.125W	91637	MFF1816G71500F
R2579[1]	321-0116-00			RES.,FXD,FILM:158 OHM,1%,0.125W	91637	MFF1816G158R0F
R2603[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R2609[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2611[1]	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R2617[1]	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	91637	MFF1816G90900F
R2619[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2627[1]	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
R2629[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2631[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2635[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2637[1]	315-0153-00	XB020631		RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2643[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2645[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2647[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2657[1]	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	91637	MFF1816G90900F
R2675[1]	321-0116-00			RES.,FXD,FILM:158 OHM,1%,0.125W	91637	MFF1816G158R0F
R2679[1]	321-0101-00			RES.,FXD,FILM:110 OHM,1%,0.125W	91637	MFF1816G110R0F
R2681[1]	321-0153-00	B010100	B020630	RES.,FXD,FILM:383 OHM,1%,0.125W	91637	MFF1816G383R0F
R2681[1]	321-0149-00	B020631		RES.,FXD,FILM:348 OHM,1%,0.125W	91637	MFF1816G348R0F
R2701[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2703[1]	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R2705[1]	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R2707[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2709[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2711[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2719[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2729[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2731[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2739[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2741[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2743[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2753[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2757[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2775[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R2777[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R2781[1]	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R2801[1]	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R2803[1]	321-0368-00			RES.,FXD,FILM:66.5K OHM,1%,0.125W	91637	MFF1816G66501F
R2807[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045

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R2809[1]	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R2813[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R2825[1]	315-0106-00	B010100	B020630X	RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R2829[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R2851[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R2853[1]	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R2857[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R2859[1]	321-0183-00			RES.,FXD,FILM:787 OHM,1%,0.125W	91637	MFF1816G787R0F
R2865[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2867[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2877[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2881[1]	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R2883[1]	321-0304-00	B010100	B020630	RES.,FXD,FILM:14.3K OHM,1%,0.125W	91637	MFF1816G14301F
R2883[1]	321-0294-00	B020631		RES.,FXD,FILM:11.3K OHM,1%,0.125W	91637	MFF1816G11301F
R2885[1]	321-0141-00			RES.,FXD,FILM:287 OHM,1%,0.125W	91637	MFF1816G287R0F
R2903[1]	321-0348-00			RES.,FXD,FILM:41.2K OHM,1%,0.125W	91637	MFF1816G41201F
R2905[1]	321-0302-00			RES.,FXD,FILM:13.7K OHM,1%,0.125W	91637	MFF1816G13701F
R2907[1]	321-0417-00			RES.,FXD,FILM:215K OHM,1%,0.125W	24546	NA55D2153F
R2909[1]	321-0617-00			RES.,FXD,FILM:111K OHM,1%,0.125W	91637	MFF1816G11102F
R2913[1]	321-0314-00			RES.,FXD,FILM:18.2K OHM,1%,0.125W	91637	MFF1816G18201F
R2917[1]	311-1225-00			RES.,VAR,NONWIR:1K OHM,20%,0.50W	32997	3386F-T04-102
R2921[1]	321-0226-00			RES.,FXD,FILM:2.21K OHM,1%,0.125W	91637	MFF1816G22100F
R2927[1]	321-0213-00			RES.,FXD,FILM:1.62K OHM,1%,0.125W	91637	MFF1816G16200F
R2929[1]	311-1226-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
R2931[1]	321-0269-00			RES.,FXD,FILM:6.19K OHM,1%,0.125W	91637	MFF1816G61900F
R2935[1]	321-0213-00			RES.,FXD,FILM:1.62K OHM,1%,0.125W	91637	MFF1816G16200F
R2941[1]	321-0256-00			RES.,FXD,FILM:4.53K OHM,1%,0.125W	91637	MFF1816G45300F
R2945[1]	321-0213-00			RES.,FXD,FILM:1.62K OHM,1%,0.125W	91637	MFF1816G16200F
R2951[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2959[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2977[1]	311-1226-00	B010100	B020630	RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
R2977[1]	311-1227-00	B020631		RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R2979[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3002[2]	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R3004[2]	315-0750-00			RES.,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505
R3006[2]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3008[2]	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R3010[2]	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R3012[2]	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R3014[2]	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R3016[2]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3020[2]	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R3029[2]	315-0103-00	B010100	B020614X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3030[2]	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R3031[2]	315-0103-00	B010100	B020614X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3032[2]	315-0475-00			RES.,FXD,CMPSN:4.7M OHM,5%,0.25W	01121	CB4755
R3034[2]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3036[2]	321-0603-07			RES.,FXD,FILM:15K OHM,0.1%,0.125W	91637	MFF1816C15001B
R3038[2]	321-0603-07			RES.,FXD,FILM:15K OHM,0.1%,0.125W	91637	MFF1816C15001B
R3039[2]	315-0103-00	B010100	B020614X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3042[2]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3044[2]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3045[2]	315-0103-00	B010100	B020614X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

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R3046[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3048[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3050[1]	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
R3051[1]	315-0103-00	B010100	B020614X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3052[1]	311-1035-00			RES.,VAR,NONWIR:50K OHM,10%,0.50W	73138	OBD
R3054[1]	311-1035-00			RES.,VAR,NONWIR:50K OHM,10%,0.50W	73138	OBD
R3055[1]	315-0103-00	B010100	B020614X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3056[1]	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R3058[1]	315-0153-00	B010100	B020614	RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3058[1]	315-0472-00	B020615		RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3060[1]	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
R3062[1]	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R3064[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3070[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3072[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R3074[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3078[1]	315-0361-00			RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R3080[1]	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R3082[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3132[1]	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
R3134[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3136[1]	315-0275-00			RES.,FXD,CMPSN:2.7M OHM,5%,0.25W	01121	CB2755
R3138[1]	315-0185-00			RES.,FXD,CMPSN:1.8M OHM,5%,0.25W	01121	CB1855
R3140[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3142[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3144[1]	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R3146[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3148[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3150[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3152[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3154[1]	315-0103-00	B010100	B020614X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3156[1]	315-0103-00	B010100	B020614X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3158[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3160[1]	315-0475-00			RES.,FXD,CMPSN:4.7M OHM,5%,0.25W	01121	CB4755
R3164[1]	321-0349-00			RES.,FXD,FILM:42.2K OHM,1%,0.125W	91637	MFF1816G42201F
R3170[1]	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R3176[1]	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R3186[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3190[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3202[1]	321-0093-00			RES.,FXD,FILM:90.9 OHM,1%,0.125W	91637	MFF1816G90R90F
R3208[1]	321-0093-00			RES.,FXD,FILM:90.9 OHM,1%,0.125W	91637	MFF1816G90R90F
R3212[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3214[1]	315-0750-00			RES.,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505
R3216[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3220[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3222[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3230[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3240[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3242[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3244[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3246[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3248[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3250[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045

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R3252[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3254[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3256[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3258[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3260[1]	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R3270[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R3272[1]	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R3276[1]	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R3280[1]	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R3290[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3292[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3294[1]	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R3296[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3298[1]	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R3322[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3324[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3326[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3328[1]	315-0184-00			RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R3330[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3334[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3338[1]	315-0184-00			RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R3340[1]	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R3342[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3344[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R3346[1]	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R3348[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3380[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3390[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3392[1]	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R3394[1]	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R3396[1]	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R3440[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3442[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3490[1]	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R3494[1]	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R3496[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3502[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3504[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3506[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3510[1]	311-0978-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3
R3512[1]	321-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.125W	91637	MFF1816G13700F
R3514[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3516[1]	315-0112-00			RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
R3518[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3520[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3524[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3530[1]	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R3532[1]	315-0112-00			RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
R3534[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3536[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3540[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3542[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3544[1]	311-0978-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3

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R3546[1]	321-0189-00			RES.,FXD,FILM:909 OHM,1%,0.125W	91637	MFF1816G909R0F
R3548[1]	315-0112-00			RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
R3550[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3554[1]	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R3556[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R3560[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3570[1]	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R3572[1]	315-0102-00	B010100	B020614	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3572[1]	315-0302-00	B020615		RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R3580[1]	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R3582[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3584[1]	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R3586[1]	315-0272-00	B010100	B020614	RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R3586[1]	315-0202-00	B020615		RES.,FXD,CMPSN:2K OHM,(NOM VALUE),SEL	01121	CB2025
R3588[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3590[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3592[1]	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R3594[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3596[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3597[1]	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R3598[1]	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R3599[1]	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R3606[1]	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R3616[1]	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R3620[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3622[1]	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R3624[1]	321-0166-00			RES.,FXD,FILM:523 OHM,1%,0.125W	91637	MFF1816G523R0F
R3640[1]	321-0166-00			RES.,FXD,FILM:523 OHM,1%,0.125W	91637	MFF1816G523R0F
R3646[1]	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R3648[1]	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R3652[1]	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499R0F
R3670[1]	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R3672[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3674[1]	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R3676[1]	321-0306-00			RES.,FXD,FILM:15K OHM,(NOM VALUE),SEL	91637	MFF1816G15001F
R3684[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3686[1]	321-0347-00			RES.,FXD,FILM:40.2K OHM,1%,0.125W	91637	MFF1816G40201F
R3688[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3690[1]	321-0287-00	B010100	B020614	RES.,FXD,FILM:9.53K OHM,1%,0.125W	91637	MFF1816G95300F
R3690[1]	321-0295-00	B020615		RES.,FXD,FILM:11.5K OHM,1%,0.125W	91637	MFF1816G11501F
R3692[1]	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
R3702[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3710[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3712[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3714[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3716[1]	321-0303-00			RES.,FXD,FILM:14K OHM,1%,0.125W	91637	MFF1816G14001F
R3719[1]	321-0386-00	B010100	B020614X	RES.,FXD,FILM:102K OHM,(NOM VALUE),SEL	91637	MFF1816G10202F
R3720[1]	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R3723[1]	321-0311-00	B010100	B020614X	RES.,FXD,FILM:16.9K OHM,(NOM VALUE),SEL	91637	MFF1816G16901F
R3724[1]	321-0254-00			RES.,FXD,FILM:4.32K OHM,1%,0.125W	91637	MFF1816G43200F
R3726[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3727[1]	315-0104-00	B010100	B020614X	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3728[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535

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R3730[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3738[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3740[1]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3742[1]	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R3744[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3746[1]	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	91637	MFF1816G90900F
R3748[1]	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R3752[1]	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R3754[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3756[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3758[1]	315-0102-00	XB020615		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3760[1]	315-0102-00	B010100	B020614	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3760[1]	315-0101-00	B020615		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3780[1]	321-0275-00			RES.,FXD,FILM:7.15K OHM,1%,0.125W	91637	MFF1816G71500F
R3786[1]	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R3790[1]	321-0122-00			RES.,FXD,FILM:182 OHM,1%,0.125W	91637	MFF1816G182R0F
R3808[1]	321-0226-00			RES.,FXD,FILM:2.21K OHM,1%,0.125W	91637	MFF1816G22100F
R3810[1]	321-0222-00	B010100	B020614	RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R3810[1]	321-0214-00	B020615		RES.,FXD,FILM:1.65K OHM,1%,0.125W	91637	MFF1816G16500F
R3812[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3816[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3817[1]	315-0106-00	B010100	B020614X	RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R3823[1]	315-0106-00	B010100	B020614X	RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R3826[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3828[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3832[1]	321-0269-00			RES.,FXD,FILM:6.19K OHM,1%,0.125W	91637	MFF1816G61900F
R3841[1]	315-0473-00	B010100	B020614X	RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R3842[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3844[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3848[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3854[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3856[1]	315-0102-00	B010100	B020614X	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3860[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3862[1]	315-0102-00	XB020615		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3864[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3870[1]	315-0105-00	XB020615		RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R3874[1]	315-0102-00	XB020615		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3876[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R3880[1]	311-1226-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
R3884[1]	321-0278-00			RES.,FXD,FILM:7.68K OHM,1%,0.125W	91637	MFF1816G76800F
R3890[1]	321-0145-00			RES.,FXD,FILM:316 OHM,1%,0.125W	91637	MFF1816G316R0F
R3892[1]	321-0109-00			RES.,FXD,FILM:133 OHM,1%,0.125W	91637	MFF1816G133R0F
R3910[1]	311-1225-00			RES.,VAR,NONWIR:1K OHM,20%,0.50W	32997	3386F-T04-102
R3916[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R3920[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3922[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3924[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R3927[1]	321-0351-00	B010100	B020614X	RES.,FXD,FILM:44.2K OHM,(NOM VALUE),SEL	91637	MFF1816G44201F
R3929[1]	321-0359-00	B010100	B020614X	RES.,FXD,FILM:53.6K OHM,(NOM VALUE),SEL	91637	MFF1816G53601F
R3930[1]	311-1226-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
R3934[1]	321-0222-00	B010100	B020614	RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R3934[1]	321-0214-00	B020615		RES.,FXD,FILM:1.65K OHM,1%,0.125W	91637	MFF1816G16500F
R3940[1]	321-0222-00	B010100	B020614	RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F

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R3940[1]	321-0214-00	B020615		RES.,FXD,FILM:1.65K OHM,1%,0.125W	91637	MFF1816G16500F
R3942[1]	321-0256-00			RES.,FXD,FILM:4.53K OHM,1%,0.125W	91637	MFF1816G45300F
R3943[1]	321-0403-00	B010100	B020614X	RES.,FXD,FILM:154K OHM,(NOM VALUE),SEL	91637	MFF1816G15402F
R3944[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R3945[1]	315-0104-00	B010100	B020614X	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3948[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3950[1]	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3951[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3952[1]	315-0396-00			RES.,FXD,CMPSN:39M OHM,5%,0.25W	01121	CB3965
R3956[1]	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3958[1]	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3960[1]	315-0102-00	XB020615		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3962[1]	321-0184-00			RES.,FXD,FILM:806 OHM,1%,0.125W	91637	MFF1816G806R0F
R3966[1]	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3970[1]	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R3980[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R3982[1]	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R3984[1]	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R3986[1]	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R3990[1]	321-0110-00			RES.,FXD,FILM:137 OHM,1%,0.125W	91637	MFF1816G137R0F
R3992[1]	321-0140-00			RES.,FXD,FILM:280 OHM,1%,0.125W	91637	MFF1816G280R0F
R3996[1]	321-0086-00			RES.,FXD,FILM:76.8 OHM,1%,0.125W	91637	MFF1816G76R80F
R4001	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R4003	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R4005	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R4021	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4033	321-0325-00			RES.,FXD,FILM:23.7K OHM,1%,0.125W	91637	MFF1816G23701F
R4063	321-0325-00			RES.,FXD,FILM:23.7K OHM,1%,0.125W	91637	MFF1816G23701F
R4103	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R4105	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R4109	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4123	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
R4127	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R4131	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
R4133	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R4135	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R4139	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4153	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
R4161	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
R4163	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R4165	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R4201	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R4209	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4215	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4223	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4231	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R4233	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R4235	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R4237	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R4239	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4241	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R4245	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4261	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925

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R4265	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R4267	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R4275	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4317	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4319	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R4321	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R4347	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4349	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R4351	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R4377	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R4381	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
R4401	321-0332-00			RES.,FXD,FILM:28K OHM,1%,0.125W	91637	MFF1816G28001F
R4403	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4405	321-0266-00			RES.,FXD,FILM:5.76K OHM,1%,0.125W	91637	MFF1816G57600F
R4407	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R4409	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4411	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R4413	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R4415	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R4419	311-1226-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
R4425	321-0178-00			RES.,FXD,FILM:698 OHM,1%,0.125W	91637	MFF1816G698R0F
R4431	321-0332-00			RES.,FXD,FILM:28K OHM,1%,0.125W	91637	MFF1816G28001F
R4433	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4435	321-0266-00			RES.,FXD,FILM:5.76K OHM,1%,0.125W	91637	MFF1816G57600F
R4437	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R4439	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4441	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R4443	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R4445	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R4449	311-1226-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
R4455	321-0178-00			RES.,FXD,FILM:698 OHM,1%,0.125W	91637	MFF1816G698R0F
R4461	321-0332-00			RES.,FXD,FILM:28K OHM,1%,0.125W	91637	MFF1816G28001F
R4463	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4465	321-0266-00			RES.,FXD,FILM:5.76K OHM,1%,0.125W	91637	MFF1816G57600F
R4467	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R4469	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R4471	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R4473	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R4475	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R4479	311-1226-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
R4485	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R4511	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R4519	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
R4521	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R4523	321-0155-00			RES.,FXD,FILM:402 OHM,1%,0.125W	91637	MFF1816G402R0F
R4525	322-0184-00			RES.,FXD,FILM:806 OHM,1%,0.25W	75042	CEBT0-8060F
R4541	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R4549	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
R4551	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R4553	321-0155-00			RES.,FXD,FILM:402 OHM,1%,0.125W	91637	MFF1816G402R0F
R4555	322-0184-00			RES.,FXD,FILM:806 OHM,1%,0.25W	75042	CEBT0-8060F
R4571	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R4579	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F

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R4581	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R4583	321-0155-00			RES.,FXD,FILM:402 OHM,1%,0.125W	91637	MFF1816G402R0F
R4585	322-0184-00			RES.,FXD,FILM:806 OHM,1%,0.25W	75042	CEBT0-8060F
R4603	316-0336-00			RES.,FXD,CMPSN:33M OHM,10%,0.25W	01121	CB3361
R4607	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R4609	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R4613	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R4615	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
R4617	301-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.50W	01121	EB5115
R4619	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4621	321-0245-00			RES.,FXD,FILM:3.48K OHM,1%,0.125W	91637	MFF1816G34800F
R4627	321-0296-00			RES.,FXD,FILM:11.8K OHM,1%,0.125W	91637	MFF1816G11801F
R4633	316-0336-00			RES.,FXD,CMPSN:33M OHM,10%,0.25W	01121	CB3361
R4637	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R4639	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R4643	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R4645	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
R4647	301-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.50W	01121	EB5115
R4649	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4651	321-0245-00			RES.,FXD,FILM:3.48K OHM,1%,0.125W	91637	MFF1816G34800F
R4657	321-0296-00			RES.,FXD,FILM:11.8K OHM,1%,0.125W	91637	MFF1816G11801F
R4663	316-0336-00			RES.,FXD,CMPSN:33M OHM,10%,0.25W	01121	CB3361
R4667	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R4669	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R4673	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R4675	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
R4677	301-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.50W	01121	EB5115
R4679	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4681	321-0245-00			RES.,FXD,FILM:3.48K OHM,1%,0.125W	91637	MFF1816G34800F
R4687	321-0296-00			RES.,FXD,FILM:11.8K OHM,1%,0.125W	91637	MFF1816G11801F
R4703	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R4705	321-0272-00			RES.,FXD,FILM:6.65K OHM,1%,0.125W	91637	MFF1816G66500F
R4709	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4711	322-0382-00			RES.,FXD,FILM:93.1K OHM,1%,0.25W	91637	MFF1421G93101F
R4719	323-0327-00			RES.,FXD,FILM:24.9K OHM,1%,0.50W	91637	MFF1226G24901F
R4727	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R4729	321-0264-00			RES.,FXD,FILM:5.49K OHM,1%,0.125W	91637	MFF1816G54900F
R4733	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R4735	321-0272-00			RES.,FXD,FILM:6.65K OHM,1%,0.125W	91637	MFF1816G66500F
R4739	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4741	322-0382-00			RES.,FXD,FILM:93.1K OHM,1%,0.25W	91637	MFF1421G93101F
R4749	323-0327-00			RES.,FXD,FILM:24.9K OHM,1%,0.50W	91637	MFF1226G24901F
R4757	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R4759	321-0264-00			RES.,FXD,FILM:5.49K OHM,1%,0.125W	91637	MFF1816G54900F
R4763	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R4765	321-0272-00			RES.,FXD,FILM:6.65K OHM,1%,0.125W	91637	MFF1816G66500F
R4769	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4771	322-0382-00			RES.,FXD,FILM:93.1K OHM,1%,0.25W	91637	MFF1421G93101F
R4779	323-0327-00			RES.,FXD,FILM:24.9K OHM,1%,0.50W	91637	MFF1226G24901F
R4787	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R4789	321-0264-00			RES.,FXD,FILM:5.49K OHM,1%,0.125W	91637	MFF1816G54900F
R4801	301-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.50W	01121	EB7515
R4803	323-0360-00			RES.,FXD,FILM:54.9K OHM,1%,0.50W	75042	CECT0-5492F

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R4807	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R4815	303-0273-00			RES.,FXD,CMPSN:27K OHM,5%,1W	01121	GB2735
R4817	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4831	301-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.50W	01121	EB7515
R4833	323-0360-00			RES.,FXD,FILM:54.9K OHM,1%,0.50W	75042	CECT0-5492F
R4837	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R4845	303-0273-00			RES.,FXD,CMPSN:27K OHM,5%,1W	01121	GB2735
R4847	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4861	301-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.50W	01121	EB7515
R4863	323-0360-00			RES.,FXD,FILM:54.9K OHM,1%,0.50W	75042	CECT0-5492F
R4867	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R4875	303-0273-00			RES.,FXD,CMPSN:27K OHM,5%,1W	01121	GB2735
R4877	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4897	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R4901	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R4931	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R4956	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R4961	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R5006	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R5008	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R5010	308-0574-00			RES.,FXD,WW:10 OHM,5%,2W	91637	RS2B162K10R00J
R5012	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
R5016	308-0688-00	B010100	B010369	RES.,FXD,WW:180 OHM,5%,8W	91637	RS7-D18R0J
R5016	308-0574-00	B010370		RES.,FXD,WW:10 OHM,5%,2W	91637	RS2B162K10R00J
R5018	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R5020	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5022	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R5023	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5024	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R5026	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R5085	303-0560-00			RES.,FXD,CMPSN:56 OHM,5%,1W	01121	GB5605
R5102	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R5106	307-0007-00			RES.,FXD,CMPSN:2.7 OHM,10%,2W	01121	GB27G1
R5108	315-0120-00			RES.,FXD,CMPSN:12 OHM,5%,0.25W	01121	CB1205
R5112	307-0007-00			RES.,FXD,CMPSN:2.7 OHM,10%,2W	01121	GB27G1
R5116	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R5122	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R5128	301-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.50W	01121	EB4735
R5135	301-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.50W	01121	EB1525
R5202	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R5215	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
R5216	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R5218	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R5220	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R5224	321-0279-00			RES.,FXD,FILM:7.87K OHM,1%,0.125W	91637	MFF1816G78700F
R5226	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R5228	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R5230	315-0102-03			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5232	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R5233	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R5235	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R5266	307-0051-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.50W	01121	EB27G5
R5278	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815

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R5290	307-0009-00			RES.,FXD,CMPSN:4.7 OHM,10%,2W	01121	GB47G1
R5294	306-0331-00			RES.,FXD,CMPSN:330 OHM,10%,2W	01121	HB3311
R5295	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R5296	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R5298	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R5302	315-0161-00			RES.,FXD,CMPSN:160 OHM,5%,0.25W	01121	CB1615
R5308	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R5310	307-0007-00			RES.,FXD,CMPSN:2.7 OHM,10%,2W	01121	GB27G1
R5312	307-0007-00			RES.,FXD,CMPSN:2.7 OHM,10%,2W	01121	GB27G1
R5314	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
R5315	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R5318	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R5320	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R5321	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R5322	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R5324	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R5326	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R5327	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5328	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R5330	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R5333	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R5334	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R5335	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R5336	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R5337	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5363	304-0100-00			RES.,FXD,CMPSN:10 OHM,10%,1W	01121	GB1001
R5365	303-0153-00			RES.,FXD,CMPSN:15K OHM,5%,1W	01121	GB1535
R5366	315-0121-00			RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R5368	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R5375	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R5376	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R5380	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R5384	308-0269-00			RES.,FXD,WW:22 OHM,5%,3W	91637	RS2B-K22R00J
R5402	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R5408	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R5414	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
R5417	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R5418	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R5419	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5420	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R5435	311-1214-00			RES.,VAR,NONWIR:200K OHM,20%,0.50W	01121	E2B204
R5440	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R5516	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R5517	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R5518	307-0051-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.50W	01121	EB27G5
R5520	315-0225-00			RES.,FXD,CMPSN:2.2M OHM,5%,0.25W	01121	CB2255
R5522	315-0394-00			RES.,FXD,CMPSN:390K OHM,5%,0.25W	01121	CB3945
R5524	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R5525	315-0185-00			RES.,FXD,CMPSN:1.8M OHM,5%,0.25W	01121	CB1855
R5526	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5530	311-1235-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	32997	3386F-T04-104
R5535	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R5536	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235

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R5538	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R5539	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R5540	311-1227-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R5550	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R5551	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5552	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5554	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5556	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5558	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R5560	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R5562	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R5564	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5567	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R5569	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R5572	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R5574	315-0155-00			RES.,FXD,CMPSN:1.5M OHM,5%,0.25W	01121	CB1555
R5580	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R5582	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R5583	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R5584	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R5586	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5588	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R5590	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
R5592	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R5595	311-1235-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	32997	3386F-T04-104
R5620	315-0395-00			RES.,FXD,CMPSN:3.9M OHM,5%,0.25W	01121	CB3955
R5626	315-0155-00			RES.,FXD,CMPSN:1.5M OHM,5%,0.25W	01121	CB1555
R5628	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R5630	311-1235-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	32997	3386F-T04-104
R5632	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R5636	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R5638	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R5644	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R5646	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R5648	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R5650	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R5652	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R5654	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R5660	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R5662	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R5664	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R5666	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5667	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5668	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R5670	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R5672	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
R5675	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R5676	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R5678	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R5680	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R5690	321-0346-00	B010100	B010369	RES.,FXD,FILM:39.2K OHM,1%,0.125W	91637	MFF1816G39201F
R5690	321-0344-00	B010370		RES.,FXD,FILM:37.4K OHM,1%,0.125W	91637	MFF1816G37401F
R5695	321-0389-00			RES.,FXD,FILM:110K OHM,1%,0.125W	91637	MFF1816G11002F

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R5696	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5700	307-0051-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.50W	01121	EB27G5
R5708	308-0441-00			RES.,FXD,WW:3 OHM,5%,3W	91637	RS2B-D3R000J
R5709	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R5710	315-0121-00			RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R5712	308-0685-00			RES.,FXD,WW:1.5 OHM,5%,1W	75042	BW20-1R500J
R5716	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R5718	315-0913-00			RES.,FXD,CMPSN:91K OHM,5%,0.25W	01121	CB9135
R5720	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R5724	308-0459-00			RES.,FXD,WW:1.1 OHM,5%,3W	91637	RS2B-D1R100J
R5736	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R5738	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R5739	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R5740	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R5742	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
R5744	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5745	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R5747	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R5748	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R5750	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R5752	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R5754	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R5755	311-1227-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R5756	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R5758	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R5762	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R5770	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R5771	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5772	315-0185-00			RES.,FXD,CMPSN:1.8M OHM,5%,0.25W	01121	CB1855
R5775	311-1235-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	32997	3386F-T04-104
R5776	311-1235-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	32997	3386F-T04-104
R5780	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
R5783	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R5784	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R5789	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5790	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R5792	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R5793	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R5795	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
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R5795	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
	----- -----			* 671A ONLY		
R5796	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5797	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
R5798	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R5802	315-0563-00			RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
R5809	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R5810	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R5815	303-0223-00			RES.,FXD,CMPSN:22K OHM,5%,1W	01121	GB2235
R5820	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
R5822	301-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.50W	01121	EB1225
R5843	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5845	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

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R5846	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5848	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R5854	315-0824-00			RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R5856	315-0563-00			RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
R5866	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5869	315-0125-00			RES.,FXD,CMPSN:1.2M OHM,5%,0.25W	01121	CB1255
R5870	315-0394-00			RES.,FXD,CMPSN:390K OHM,5%,0.25W	01121	CB3945
R5872	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R5874	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5875	321-0443-00			RES.,FXD,FILM:402K OHM,1%,0.125W	91637	MFF1816G40202F
R5875	----- -----			* 671A ONLY		
R5876	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5878	321-0442-00			RES.,FXD,FILM:392K OHM,1%,0.125W	91637	MFF1816G39202F
R5884	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R5885	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5886	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R5887	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R5888	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5894	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R5902	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R5905	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5907	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R5918	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R5927	301-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.50W	01121	EB1225
R5930	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R5936	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R5938	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R5940	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R5942	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R5950	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5952	315-0824-00			RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R5954	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R5956	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R5958	315-0564-00			RES.,FXD,CMPSN:560K OHM,5%,0.25W	01121	CB5645
	----- -----			* 671A ONLY		
R5958	315-0434-00			RES.,FXD,CMPSN:430K OHM,5%,0.25W	01121	CB4345
	----- -----			* 670A ONLY		
R5959	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R5960	315-0274-00			RES.,FXD,CMPSN:270K OHM,5%,0.25W	01121	CB2745
	----- -----			* 671A ONLY		
R5960	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
	----- -----			* 670A ONLY		
R5961	315-0123-00	B010100	B010369X	RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R5962	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5964	315-0434-00			RES.,FXD,CMPSN:430K OHM,5%,0.25W	01121	CB4345
R5965	315-0824-00			RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R5966	315-0164-00			RES.,FXD,CMPSN:160K OHM,5%,0.25W	01121	CB1645
R5967	315-0563-00			RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
R5968	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R5970	315-0824-00			RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R5971	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R5972	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R5974	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

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R5976	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R5977	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
R5978	321-0510-00			RES.,FXD,FILM:2M OHM,1%,0.125W	91637	HFF188G20003F
R5980	321-0618-00			RES.,FXD,FILM:250K OHM,1%,0.125W	91637	MFF1816G25002F
	----- -----			* 670A ONLY		
R5980	321-0431-00			RES.,FXD,FILM:301K OHM,1%,0.125W	91637	MFF1816G30102F
	----- -----			* 671A ONLY		
R5981	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R5982	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R5985	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R5986	315-0564-00			RES.,FXD,CMPSN:560K OHM,5%,0.25W	01121	CB5645
R5988	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R5990	321-0261-00			RES.,FXD,FILM:5.11K OHM,1%,0.125W	91637	MFF1816G51100F
R5992	315-0684-00			RES.,FXD,CMPSN:680K OHM,5%,0.25W	01121	CB6845
R5994	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
R5995	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R5996	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
R5997	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R5998	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R5999	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R6031	302-0100-00			RES.,FXD,CMPSN:10 OHM,10%,0.50W	01121	EB1001
R6032	302-0100-00			RES.,FXD,CMPSN:10 OHM,10%,0.50W	01121	EB1001
R6033	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6050	315-0434-00			RES.,FXD,CMPSN:430K OHM,(NOM VALUE),SEL	01121	CB4345
R6052	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R6056	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R6059	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
R6060	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R6064	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R6078	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R6084	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R6086	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6088	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6090	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R6100	315-0684-00			RES.,FXD,CMPSN:680K OHM,5%,0.25W	01121	CB6845
R6101	315-0684-00			RES.,FXD,CMPSN:680K OHM,5%,0.25W	01121	CB6845
R6156	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R6162	306-0472-00			RES.,FXD,CMPSN:4.7K OHM,10%,2W	01121	HB4721
R6180	301-0185-00			RES.,FXD,CMPSN:1.8M OHM,5%,0.50W	01121	EB1855
	----- -----			(R6180 FURN AS A UNIT WITH 119-0724-00)		
R6186	306-0473-00			RES.,FXD,CMPSN:47K OHM,10%,2W	01121	HB4731
	----- -----			(R6186 FURN AS A UNIT WITH 119-0724-00)		
R6187	306-0473-00			RES.,FXD,CMPSN:47K OHM,10%,2W	01121	HB4731
	----- -----			(R6187 FURN AS A UNIT WITH 119-0724-00)		
R6191	307-0437-03			RES.,FXD,FILM:H.V. DIV	80009	307-0437-03
	----- -----			(R6191 FURN AS A UNIT WITH 119-0724-00)		
R6195	301-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.50W	01121	EB5135
	----- -----			(R6195 FURN AS A UNIT WITH 119-0724-00)		
R6201	303-0203-00			RES.,FXD,CMPSN:20K OHM,5%,1W	01121	GB2035
R6213	304-0102-00			RES.,FXD,CMPSN:1K OHM,10%,1W	01121	GB1021
R6215	304-0102-00			RES.,FXD,CMPSN:1K OHM,10%,1W	01121	GB1021

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R6217	304-0102-00			RES.,FXD,CMPSN:1K OHM,10%,1W	01121	GB1021
R6233	304-0102-00			RES.,FXD,CMPSN:1K OHM,10%,1W	01121	GB1021
R6239	304-0104-00			RES.,FXD,CMPSN:100K OHM,10%,1W	01121	GB1041
R6241	304-0103-00			RES.,FXD,CMPSN:10K OHM,10%,1W	01121	GB1031
R6261[1]	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R6269[1]	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R6273[1]	321-0198-00			RES.,FXD,FILM:1.13K OHM,1%,0.125W	91637	MFF1816G11300F
R6275[1]	321-0169-00			RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562R0F
R6277[1]	321-0169-00			RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562R0F
R6279[1]	321-0198-00			RES.,FXD,FILM:1.13K OHM,1%,0.125W	91637	MFF1816G11300F
R6309	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R6311	315-0164-00			RES.,FXD,CMPSN:160K OHM,5%,0.25W	01121	CB1645
R6315	315-0364-00			RES.,FXD,CMPSN:360K OHM,5%,0.25W	01121	CB3645
R6317	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R6405	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R6409	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R6412	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R6415	315-0335-00			RES.,FXD,CMPSN:3.3M OHM,(NOM VALUE),SEL	01121	CB3355
R6425	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R6426	SELECTED					
R6427	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R6429	315-0105-00	B010100	B029999X	RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R6433	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6435	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R6455	307-0093-00			RES.,FXD,CMPSN:1.2 OHM,5%,0.50W	01121	EB12G5
R6457	307-0093-00			RES.,FXD,CMPSN:1.2 OHM,5%,0.50W	01121	EB12G5
R6459	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R6463	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R6475	308-0387-00			RES.,FXD,WW:178 OHM,1%,3W	91637	RS2B-B178R0F
R6503	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R6507	308-0245-00			RES.,FXD,WW:0.6 OHM,5%,2W	91637	CW-2B30.60HM 5%
R6523	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R6545	323-0481-00			RES.,FXD,FILM:1M OHM,1%,0.50W	75042	CECT0-1004F
R6547	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R6551	321-0332-00			RES.,FXD,FILM:28K OHM,1%,0.125W	91637	MFF1816G28001F
R6553	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R6609	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R6611	315-0150-00			RES.,FXD,CMPSN:15 OHM,5%,0.25W	01121	CB1505
R6613	315-0150-00			RES.,FXD,CMPSN:15 OHM,5%,0.25W	01121	CB1505
R6623	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R6631	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6635	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R6637	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R6643	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R6645	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R6655	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
R6661	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R6667	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R6669	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R6675	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6705	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R6713	321-0299-00			RES.,FXD,FILM:12.7K OHM,1%,0.125W	91637	MFF1816G12701F
R6715	304-0102-00			RES.,FXD,CMPSN:1K OHM,10%,1W	01121	GB1021

[1] OPTION 2 ONLY.

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R6717	304-0102-00			RES.,FXD,CMPSN:1K OHM,10%,1W	01121	GB1021
R6719	304-0103-00			RES.,FXD,CMPSN:10K OHM,10%,1W	01121	GB1031
R6721	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R6737	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6743	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R6745	321-0367-00			RES.,FXD,FILM:64.9K OHM,1%,0.125W	91637	MFF1816G64901F
R6747	321-0385-00			RES.,FXD,FILM:100K OHM,1%,0.125W	91637	MFF1816G10002F
R6754	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R6757	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R6761	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R6765	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R6767	322-0510-00			RES.,FXD,FILM:2M OHM,1%,0.25W	75042	CEBT0-2004D
R6775	321-0414-00			RES.,FXD,FILM:200K OHM,1%,0.125W	91637	MFF1816G20002F
R6777	306-0124-00			RES.,FXD,CMPSN:120K OHM,10%,2W	01121	HB1241
R6781	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R6783	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R6785	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R6790	315-0103-00	XB030000		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R6811	321-0393-00			RES.,FXD,FILM:121K OHM,1%,0.125W	91637	MFF1816G12102F
R6815	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R6817	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6819	315-0274-00			RES.,FXD,CMPSN:270K OHM,5%,0.25W	01121	CB2745
R6823	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R6829	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R6831	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R6835	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R6839	303-0433-00			RES.,FXD,CMPSN:43K OHM,5%,1W	01121	GB4335
R6841	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R6845	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R6871	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
R6873	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R6903	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R6917	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R6921	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R6933	315-0395-00			RES.,FXD,CMPSN:3.9M OHM,5%,0.25W	01121	CB3955
R6943	304-0474-00			RES.,FXD,CMPSN:470K OHM,10%,1W	01121	GB4741
R6951	315-0107-00	B010100	B029999	RES.,FXD,CMPSN:100M OHM,5%,0.25W	01121	CB1075
R6951	315-0106-00	B030000		RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R6953	311-1257-00	XB030000		RES.,VAR,NONWIR:5M OHM,20%,0.50W	32997	3386F-T04-505
R7001	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R7003	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R7007	321-0325-00			RES.,FXD,FILM:23.7K OHM,1%,0.125W	91637	MFF1816G23701F
R7103	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R7105	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R7111	321-0325-00			RES.,FXD,FILM:23.7K OHM,1%,0.125W	91637	MFF1816G23701F
R7201	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R7203	311-1214-00			RES.,VAR,NONWIR:200K OHM,20%,0.50W	01121	E2B204
R7207	315-0274-00			RES.,FXD,CMPSN:270K OHM,5%,0.25W	01121	CB2745
R7209	323-0373-00			RES.,FXD,FILM:75K OHM,1%,0.50W	75042	CECT0-7502F
R7211	311-1227-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R7301	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
R7303	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R7305	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503

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R7307	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R7311	315-0304-00			RES.,FXD,CMPSN:300K OHM,5%,0.25W	01121	CB3045
R7401	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
R7403	311-1235-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	32997	3386F-T04-104
R7405	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R7407	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R7605	302-0560-00			RES.,FXD,CMPSN:56 OHM,10%,0.50W	01121	EB5601
R7607	321-0373-00			RES.,FXD,FILM:75K OHM, 1%,0.125W	91637	MFF1816G75001F
R7609	302-0560-00			RES.,FXD,CMPSN:56 OHM,10%,0.50W	01121	EB5601
	----- -----			*671A ONLY		
R7615	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R7701	311-1297-00			RES.,VAR,NONWIR:10K OHM,20%,1W	01121	11M411
	----- -----			* FURN AS A UNIT WITH S7701		
R7703	311-1898-00			RES.,VAR,NONWIR:2K X 10K OHM,0.5W,20%	01121	15M136
	----- -----			* FURNISHED AS A UNIT W/S7703,S7724 AND R7724		
R7705	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R7707	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R7709	302-0220-00			RES.,FXD,CMPSN:22 OHM,10%,0.50W	01121	EB2201
R7710	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
R7711	321-0327-00			RES.,FXD,FILM:24.9K OHM,1%,0.125W	91637	MFF1816G24901F
R7712	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R7719	321-0275-00			RES.,FXD,FILM:7.15K OHM,1%,0.125W	91637	MFF1816G71500F
R7720	321-0413-00			RES.,FXD,FILM:196K OHM,1%,0.125W	91637	MFF1816G19602F
R7724	311-1898-00			RES.,VAR,NONWIR:2K X 10K OHM,0.5W,20%	01121	15M136
	----- -----			* FURNISHED AS A UNIT W/S7724,S7703 AND R7703		
R7727	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499R0F
R7801	311-1297-00			RES.,VAR,NONWIR:10K OHM,20%,1W	01121	11M411
	----- -----			* FURNISHED AS A UNIT WITH S7801		
R7803	311-1230-00			RES.,VAR,NONWIR:20K OHM,20%,0.50W	32997	3386F-T04-203
R7805	321-0391-00			RES.,FXD,FILM:115K OHM,1%,0.125K	91637	MFF1816G11502F
R7807	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R7809	302-0150-00			RES.,FXD,CMPSN:15 OHM,10%,0.50W	01121	EB1501
R7815	321-0290-00			RES.,FXD,FILM:10.2K OHM,1%,0.125W	91637	MFF1816G10201F
R7817	321-0257-00			RES.,FXD,FILM:4.64K OHM,1%,0.125W	91637	MFF1816G46400F
R7901	311-1297-00			RES.,VAR,NONWIR:10K OHM,20%,1W	01121	11M411
R7901	----- -----			* FURN AS A UNIT WITH S7901		
R7903	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
R7905	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R7907	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R7913	321-0340-00			RES.,FXD,FILM:34K OHM,1%,0.125W	91637	MFF1816G34001F
R8011	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R8013	321-0248-00			RES.,FXD,FILM:3.74K OHM,1%,0.125W	91637	MFF1816G37400F
R8015	321-0265-00			RES.,FXD,FILM:5.62K OHM,1%,0.125W	91637	MFF1816G56200F
R8017	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R8019	321-0265-00			RES.,FXD,FILM:5.62K OHM,1%,0.125W	91637	MFF1816G56200F
R8033	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R8035	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R8037	321-0183-00			RES.,FXD,FILM:787 OHM,1%,0.125W	91637	MFF1816G787R0F
R8045	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R8101	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R8111	321-0294-00			RES.,FXD,FILM:11.3K OHM,1%,0.125W	91637	MFF1816G11301F
R8121	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
R8131	321-0183-00			RES.,FXD,FILM:787 OHM,1%,0.125W	91637	MFF1816G787R0F

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R8133	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R8145	308-0244-00			RES.,FXD,WW:0.3 OHM,10%,2W	91637	RS2B162ER3000K
R8147	308-0244-00			RES.,FXD,WW:0.3 OHM,10%,2W	91637	RS2B162ER3000K
R8151	308-0244-00			RES.,FXD,WW:0.3 OHM,10%,2W	91637	RS2B162ER3000K
R8161	321-0231-00			RES.,FXD,FILM:2.49K OHM,1%,0.125W	91637	MFF1816G24900F
R8163	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R8181	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R8191	308-0245-00			RES.,FXD,WW:0.6 OHM,5%,2W	91637	CW-2B30.60HM 5%
R8201	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R8203	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R8205	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R8231	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R8233	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R8271	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R8273	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R8287	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R8291	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R8361	321-0205-00			RES.,FXD,FILM:1.33K OHM,1%,0.125W	91637	MFF1816G13300F
R8371	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R8385	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R8393	308-0212-00			RES.,FXD,WW:10K OHM,5%,3W	91637	CW2B-B10001J
R8425	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R8461	321-0282-00			RES.,FXD,FILM:8.45K OHM,1%,0.125W	91637	MFF1816G84500F
R8463	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R8465	321-0302-00			RES.,FXD,FILM:13.7K OHM,1%,0.125W	91637	MFF1816G13701F
R8467	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R8485	322-0396-00			RES.,FXD,FILM:130 OHM,1%,0.25W	91637	MFF1421G13002F
R8561	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R8801	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R8803	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R8843	308-0459-00			RES.,FXD,WW:1.1 OHM,5%,3W	91637	RS2B-D1R100J
R8865	305-0333-00			RES.,FXD,CMPSN:33K OHM,5%,2W	01121	HB3335
R8883	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R8903	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R8911	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R8935	308-0219-00			RES.,FXD,WW:6 OHM,5%,25W	91637	HL2502Z66R000J
R8940	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R8945	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R8971	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R8975	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
RT8981	307-0361-00			RES.,THERMAL:25 OHM,20%	73803	2-GT4-1
S7005	260-0723-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
S7009	260-0723-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
S7107	260-0723-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
S7205	260-0723-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
S7501	260-1575-00	B010100	B030859	SWITCH,PUSH:1 STA,2 POLE,5 BUTTON FRAME	80009	260-1575-00
	----- -----			* 670A ONLY. S7501,S7503,S7505 AND S7601		
	----- -----			* FURNISHED AS A UNIT		
S7501	260-1575-01	B030860		SWITCH,PUSH:1 STA,2 POLE,SCAN	80009	260-1575-01
	----- -----			* 670A ONLY. S7501,S7503,S7505 AND S7601		
	----- -----			* FURNISHED AS A UNIT		
S7501	260-1617-00	B010100	B030859	SWITCH,PUSH:SIZE	80009	260-1617-00

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S7501	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
S7501	----- -----			* FURNISHED AS A UNIT		
S7501	260-1617-01	B030860		SWITCH,PUSH:5 STA,2 POLE,SCAN	80009	260-1617-01
	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
	----- -----			* FURNISHED AS A UNIT		
S7503	260-1575-00	B010100	B030859	SWITCH,PUSH:1 STA,2 POLE,5 BUTTON FRAME	80009	260-1575-00
	----- -----			* 670A ONLY. S7501,S7503,S7505 AND S7601		
	----- -----			* FURNISHED AS A UNIT		
S7503	260-1575-01	B030860		SWITCH,PUSH:1 STA,2 POLE,SCAN	80009	260-1575-01
	----- -----			* 670A ONLY. S7501,S7503,S7505 AND S7601		
	----- -----			* FURNISEHD AS A UNIT		
S7503	260-1617-00	B010100	B030859	SWITCH,PUSH:HORIZ DLY	80009	260-1617-00
	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
	----- -----			* FURNISHED AS A UNIT		
S7503	260-1617-01	B030860		SWITCH,PUSH:5 STA,2 POLE,SCAN	80009	260-1617-01
	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
	----- -----			* FURNISHED AS A UNIT		
S7505	260-1575-00	B010100	B030859	SWITCH,PUSH:VERT DLY	80009	260-1575-00
	----- -----			* 670A ONLY. S7501,S7503,S7505 AND S7601		
	----- -----			* FURNISHED AS A UNIT		
S7505	260-1575-01	B030860		SWITCH,PUSH:1 STA,2 POLE,SCAN	80009	260-1575-01
	----- -----			* 670A ONLY. S7501,S7503,S7505 AND S7601		
	----- -----			* FURNISHED AS A UNIT		
S7505	260-1617-00	B010100	B030859	SWITCH,PUSH:VERT DLY	80009	260-1617-00
	----- -----			* 671A ONLY. S7601,S7503,S7505,S7601 & S7603		
	----- -----			* FURNISHED AS A UNIT		
S7505	260-1617-01	B030860		SWITCH,PUSH:5 STA,2 POLE,SCAN	80009	260-1617-01
	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
	----- -----			* FURNISHED AS A UNIT		
S7507	260-1574-00	B010100	B030859	SWITCH,PUSH:B	80009	260-1574-00
	----- -----			* 670A ONLY. S7507,S7509,S7511 AND S7609		
	----- -----			* FURNISHED AS A UNIT		
S7507	260-1574-01	B030860		SWITCH,PUSH:1 STA,2 POLE,INPUT/MODE	80009	260-1574-01
	----- -----			* 670A ONLY. S7507,S7509,S7511 AND S7609		
	----- -----			* FURNISHED AS A UNIT		
S7509	260-1574-00	B010100	B030859	SWITCH,PUSH:EXT	80009	260-1574-00
	----- -----			* 670A ONLY. S7507,S7509,S7511 AND S7609		
	----- -----			* FURNISHED AS A UNIT		
S7509	260-1574-01	B030860		SWITCH,PUSH:1 STA,2 POLE,INPUT/MODE	80009	260-1574-01
	----- -----			* 670A ONLY. S7507,S7509,S7511 AND S7609		
	----- -----			* FURNISHED AS A UNIT		
S7511	260-1574-00	B010100	B030859	SWITCH,PUSH:COLOR	80009	260-1574-00
	----- -----			* 670A ONLY. S7507,S7509,S7511 AND S7609		
	----- -----			* FURNISHED AS A UNIT		
S7511	260-1574-01	B030860		SWITCH,PUSH:1 STA,2 POLE,INPUT/MODE	80009	260-1574-01
	----- -----			* 670A ONLY. S7507,S7509,S7511 AND S7609		
	----- -----			* FURNISHED AS A UNIT		
S7601	260-1575-00	B010100	B030859	SWITCH,PUSH:NTSC TEST	80009	260-1575-00
	----- -----			* 670A ONLY. S7501,S7503,S7505 AND S7601		
	----- -----			* FURNISHED AS A UNIT		
S7601	260-1575-01	B030860		SWITCH,PUSH:1 STA,2 POLE,SCAN	80009	260-1575-01
	----- -----			* 670A ONLY. S7501,S7503,S7505 AND S7601		
	----- -----			* FURNISHED AS A UNIT		

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S7601	260-1617-00	B010100	B030859	SWITCH,PUSH:NTSC TEST	80009	260-1617-00
	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
	----- -----			* FURNISHED AS A UNIT		
S7601	260-1617-01	B030860		SWITCH,PUSH:5 STA,2 POLE,SCAN	80009	260-1617-01
	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
	----- -----			* FURNISHED AS A UNIT		
S7603	260-1617-00	B010100	B030859	SWITCH,PUSH:NTSC TEST	80009	260-1617-00
	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
	----- -----			* FURNISHED AS A UNIT		
S7603	260-1617-01	B030860		SWITCH,PUSH:5 STA,2 POLE,SCAN	80009	260-1617-01
	----- -----			* 671A ONLY. S7501,S7503,S7505,S7601 AND S7603		
	----- -----			* FURNISHED AS A UNIT		
S7609	260-1574-00	B010100	B030859	SWITCH,PUSH:B & W	80009	260-1574-00
	----- -----			* 670A ONLY. S7507,S7509,S7511 AND S7609		
	----- -----			* FURNISHED AS A UNIT		
S7609	260-1574-01	B030860		SWITCH,PUSH:1 STA,2 POLE,INPUT/MODE	80009	260-1574-01
	----- -----			* 670A ONLY. S7507,S7509,S7511 AND S7609		
	----- -----			* FURNISHED AS A UNIT		
S7701	311-1297-00			RES.,VAR,NONWIR:10K OHM,20%,1W	01121	11M411
	----- -----			* FURN AS A UNIT WITH R7701		
S7703	311-1898-00			RES.,VAR,NONWIR:2K X 10K OHM,0.5W,20%	01121	15M136
	----- -----			* FURNISHED AS A UNIT WITH R7703,R7724 & S7724		
S7724	311-1898-00			RES.,VAR,NONWIR:2K X 10K OHM,0.5W,20%	01121	15M136
	----- -----			* FURNISHED AS A UNIT WITH R7703,R7724 & S7703		
S7801	311-1297-00			RES.,VAR,NONWIR:10K OHM,20%,1W	01121	11M411
	----- -----			(S7801 FURN AS A UNIT WITH R7801)		
S7901	311-1297-00			RES.,VAR,NONWIR:10K OHM,20%,1W	01121	11M411
	----- -----			(S7901 FURN AS A UNIT WITH R7901)		
S8993	260-0574-01			SWITCH,PUSH:SPDT,10A,250VAC	80009	260-0574-01
S8995	260-1060-01			SWITCH,TOGGLE:DPST,15A,125VAC	27193	8906K-2507
T3446	120-0586-00			XFMR,TOROID:10 TURNS QUADFILAR	80009	120-0586-00
T3446	----- -----			* 671A ONLY		
T5030	120-0914-00			XFMR,LINEARITY:POT CORE	80009	120-0914-00
T5090	120-0912-00			XFMR,BASE DRIVE:POT CORE	80009	120-0912-00
T5170	120-0913-01			XFMR,FLY BACK:	80009	120-0913-01
T5170	----- -----			* 671A ONLY		
T5170	120-0913-00	B010100	B010134	XFMR,FLY BACK:	80009	120-0913-01
T5170	----- -----			* 670A ONLY		
T5170	120-0913-01	B010135		XFMR,FLY BACK:	80009	120-0913-01
T5170	----- -----			* 670A ONLY		
T5830	120-0753-00			XFMR,PIN CUSH:	80009	120-0753-00
T6160	108-0817-00			COIL,RF:3.12MH	80009	108-0817-00
	----- -----			(T6160 FURN AS A UNIT WITH 119-0724-00)		
T6184	120-0979-00			XFMR,POT CORE:	80009	120-0979-00
	----- -----			(T6184 FURN AS A UNIT WITH 119-0724-00)		
T6371	120-0911-00			XFMR,HV PWR:	80009	120-0911-00
T8891	120-0910-00			XFMR,PWR:	80009	120-0910-00
U135	155-0032-01			MICROCIRCUIT,LI:MONOLITHIC,INPUT PRE-AMPL	80009	155-0032-01
U1005	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	80009	156-0032-00
U1013	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U1049	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N

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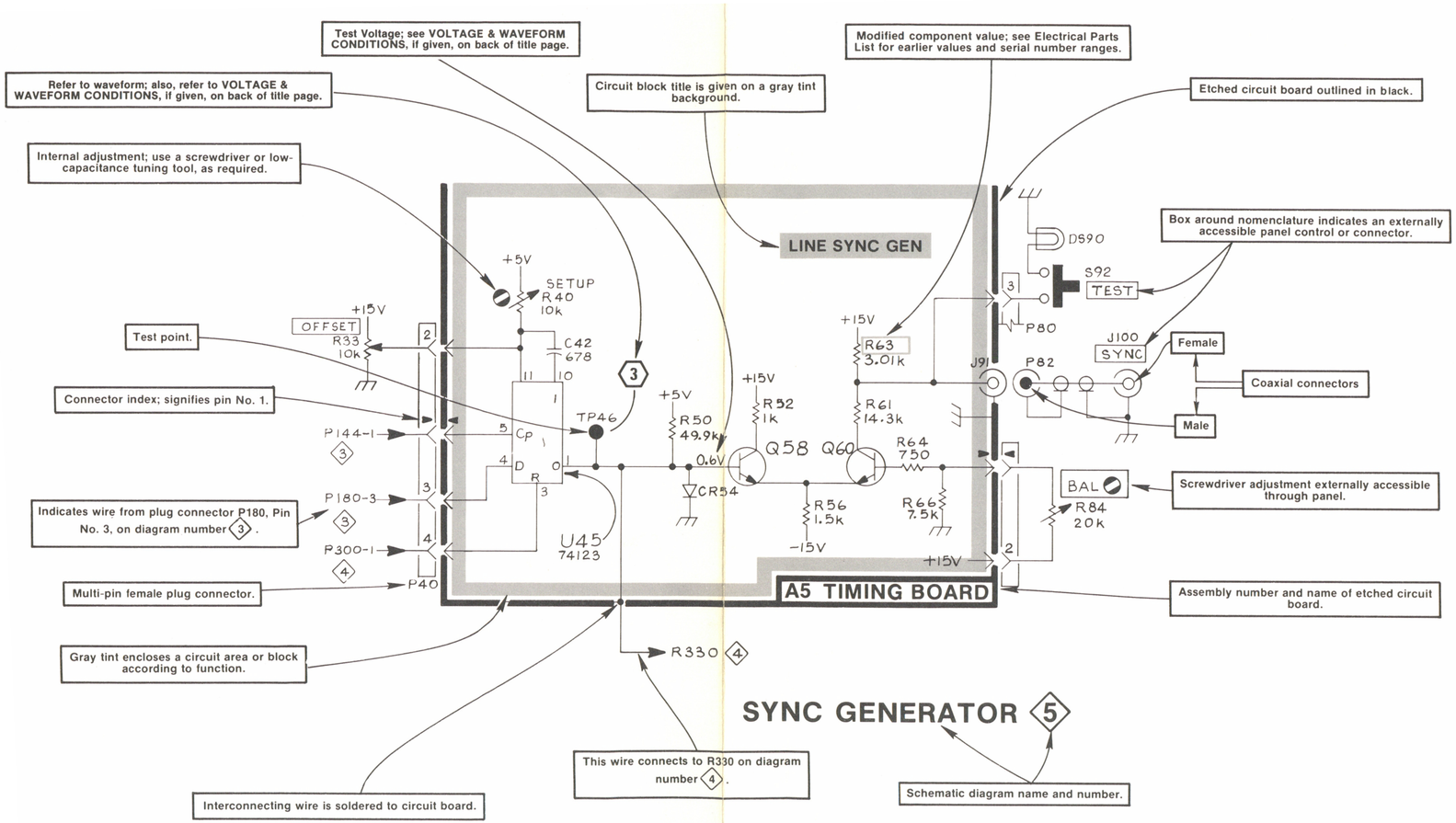
U1101	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	80009	156-0032-00
U1105	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U1127	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U1137	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U1227	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U1397	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U1397	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U1517	155-0032-01			MICROCIRCUIT,LI:MONOLITHIC,INPUT PRE-AMPL	80009	155-0032-01
U1697	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U1697	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U2027[1]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U2027[1]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U2051[1]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U2051[1]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U2053[1]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U2053[1]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U2125[1]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U2125[1]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U2181[1]	156-0178-00			MICROCIRCUIT,DI:TRIPLE 3-INPUT NOR GATE	01295	SN7427N
U2405[1]	156-0130-00			MICROCIRCUIT,LI:BALANCED MODEM	80009	156-0130-00
U2425[1]	156-0130-00			MICROCIRCUIT,LI:BALANCED MODEM	80009	156-0130-00
U2723[1]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U2723[1]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U2737[1]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U2737[1]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U2755[1]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U2755[1]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U2861[1]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U2861[1]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U3030[2]	156-0158-00	B010100	B020622	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U3030[2]	156-0158-05	B020623		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
U3040[2]	156-0158-00	B010100	B020622	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U3040[2]	156-0158-05	B020623		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
U3050[2]	156-0158-00	B010100	B020622	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U3050[2]	156-0158-05	B020623		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
U3130[2]	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U3156[2]	156-0158-00	B010100	B020622	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U3156[2]	156-0158-05	B020623		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
U3180[2]	156-0178-00			MICROCIRCUIT,DI:TRIPLE 3-INPUT NOR GATE	01295	SN7427N
U3510[2]	156-0130-00			MICROCIRCUIT,LI:BALANCED MODEM	80009	156-0130-00
U3526[2]	156-0130-00			MICROCIRCUIT,LI:BALANCED MODEM	80009	156-0130-00
U3544[2]	156-0130-00			MICROCIRCUIT,LI:BALANCED MODEM	80009	156-0130-00
U3824[2]	156-0158-00	B010100	B020622	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U3824[2]	156-0158-05	B020623		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
U3850[2]	156-0158-00	B010100	B020622	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U3850[2]	156-0158-05	B020623		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-05
U3957[2]	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U3957[2]	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U4107	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U4137	156-0048-00			MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY	80009	156-0048-00
U4505	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U4505	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U4535	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00

[1] 670A ONLY.
[2] 671A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U4535	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U4565	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U4565	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5370	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5370	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5575	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5575	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5620	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5620	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5665	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5665	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5685	156-0067-02			MICROCIRCUIT,LI:OPNL AMPLIFIER,SELECTED	80009	156-0067-02
U5770	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5770	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5845	156-0067-02			MICROCIRCUIT,LI:OPNL AMPLIFIER,SELECTED	80009	156-0067-02
U5860	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5860	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5875	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5875	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5945	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5945	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5946	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5946	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5960	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5960	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U5975	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U5975	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U6074	156-0067-02			MICROCIRCUIT,LI:OPNL AMPLIFIER,SELECTED	80009	156-0067-02
U6401	156-0049-00	B010100	B020559	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0049-00
U6401	156-0700-01	B020560		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0700-01
U6619	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL	80009	156-0072-00
U6723	156-0067-02			MICROCIRCUIT,LI:OPNL AMPLIFIER,SELECTED	80009	156-0067-02
U8105	156-0071-00			MICROCIRCUIT,LI:VOLTAGE REGULATOR	80009	156-0071-00
U8135	156-0071-00			MICROCIRCUIT,LI:VOLTAGE REGULATOR	80009	156-0071-00
V6200	154-0712-03			ELECTRON TUBE:CRT ASSEMBLY	80009	154-0712-03
VR122	152-0514-00			SEMICOND DEVICE:ZENER,0.4W,10V,1%	80009	152-0514-00
VR131	152-0212-00			SEMICOND DEVICE:ZENER,0.5W,9V,5%	80009	152-0212-00
VR1415	152-0461-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	1N821
VR2275[1]	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR2463[1]	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR2639[1]	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR2879[1]	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR3174[2]	152-0280-00	B010100	B020614	SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00
VR3174[2]	152-0166-00	B020615		SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR3586[2]	152-0166-00	XB020615		SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR3676[2]	152-0280-00	B010100	B020614	SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00
VR3676[2]	152-0166-00	B020615		SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR3738[2]	152-0280-00	B010100	B020614	SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00
VR3738[2]	152-0166-00	B020615		SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR3968[2]	152-0280-00	B010100	B020614	SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00
VR3968[2]	152-0166-00	B020615		SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR4473	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035

[1] 670A ONLY.
[2] 671A ONLY.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
VR4513	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR4543	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR5130	152-0284-00			SEMICOND DEVICE:ZENER,0.4W,47V,5%	04713	1N977B
VR5782	152-0055-00			SEMICOND DEVICE:ZENER,0.4W,11V,5%	80009	152-0055-00
VR5882	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-9035
VR6615	152-0279-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	80009	152-0279-00
VR8487	152-0288-00			SEMICOND DEVICE:ZENER,0.4W,140V,5%	80009	152-0288-00
VR8709	152-0573-00			SEMICOND DEVICE:ZENER,10W,5.6V,5%	04713	1N3997AR
VR8931	152-0280-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00
Y2115	158-0069-00			XTAL UNIT,QTZ:3.579545 MHZ,+/-0.0035%	75378	TX-005
	----- -----			* 670A ONLY		
Y3114	158-0075-00			XTAL UNIT,QTZ:4.433619 MHZ,+/-0.0035%	75378	TX-007
	----- -----			* 671A ONLY		



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SCHEMATIC EXAMPLE

(2234)2338-50

DIAGRAMS & CIRCUIT BOARD ILLUSTRATIONS

This section of the manual contains block and schematic diagrams with waveforms, and etched circuit board illustrations.

Symbols

Symbols used on the diagrams are based on ANSI Y32.2-1975 and IEEE No. 315 March 1971. Logic symbology is based on ANSI Y32.14-1973 (IEEE Std. 91-1973). Logic symbols depict the logic function performed and may differ from the manufacturer's data.

Component values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).

Resistors = Ohms (Ω).

Semiconductor Types

Refer to the Replaceable Electrical Parts list.

Reference Designators

The following letters are used as reference designators to identify components or assemblies on Tektronix, Inc. schematic diagrams.

A	Assembly, separable or repairable (circuit board, etc.)
AT	Attenuator, fixed or variable
B	Motor
BT	Battery
C	Capacitor, fixed or variable
CR	Diode, signal or rectifier
DH	Decoupling Hybrid
DL	Delay Line
DS	Indicating device (lamp)
E	Spark Gap
F	Fuse
FL	Filter
H	Heat dissipating device (heat sink, heat radiator, etc.)
HR	Heater
J	Connector, stationary portion
K	Relay
L	Inductor, fixed or variable
LR	Inductor/resistor combination
M	Meter
P	Connector, movable portion
Q	Transistor, silicon-controlled rectifier, or programmable unijunction transistor
R	Resistor, fixed or variable
RT	Thermistors
S	Switch
T	Transformer
TC	Thermocouple
TP	Test Point
U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
V	Electron tube
VR	Voltage regulator (zener diode, etc.)
Y	Crystal

Partial Schematic Diagram With Explanations

The partial diagram at the left is an example of the various symbols and other information provided on Tektronix, Inc. diagrams.

VOLTAGE AND WAVEFORM TEST CONDITIONS

A 1-volt p-p, 75% amplitude, 7.5% setup, NTSC standard color bar signal was applied through a 75-ohm in-line termination to the 670A NTSC Monitor VIDEO INPUT A connector to obtain the waveform photographs. The waveforms are not absolute and may vary between instruments because of differing component tolerances and internal calibration.

A 1-volt p-p 75% amplitude, 0% setup, PAL standard color bar signal was applied to the instrument to obtain the waveforms for the PAL decoder board.

Dc coupling was used to obtain the dc levels that are recorded at the right side of each waveform. Ac coupling, when indicated below the waveform, was used to block the dc component when a higher amplitude display was desired. To indicate the time relationship between signals, the test oscilloscope was triggered externally from the generator composite sync signal except when indicated above the waveform.

Dc circuit voltages for the LV Power Supply diagram were measured using a 20,000 Ω/Volt VOM: 115 VAC applied to Monitor.

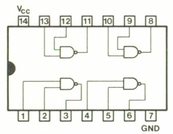
The 670A or 671A Monitor controls were set as follows (except as indicated below the waveform):

Left Front Panel Controls

All slide switches up and all adjustments as set when the instrument was calibrated.

Right Front Panel Controls

POWER switch set to ON. All variable controls set to PRESET. All pushbuttons out except NTSC TEST (670A) or DEMOD TEST (671A) pushbutton is in.



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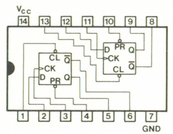

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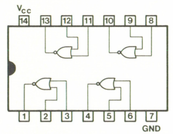

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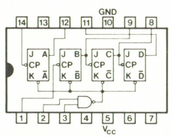

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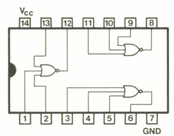

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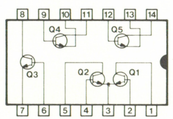

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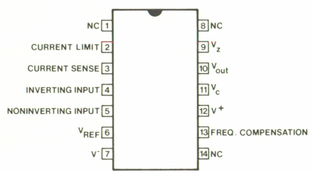

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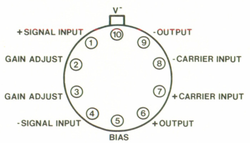

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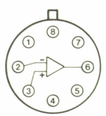

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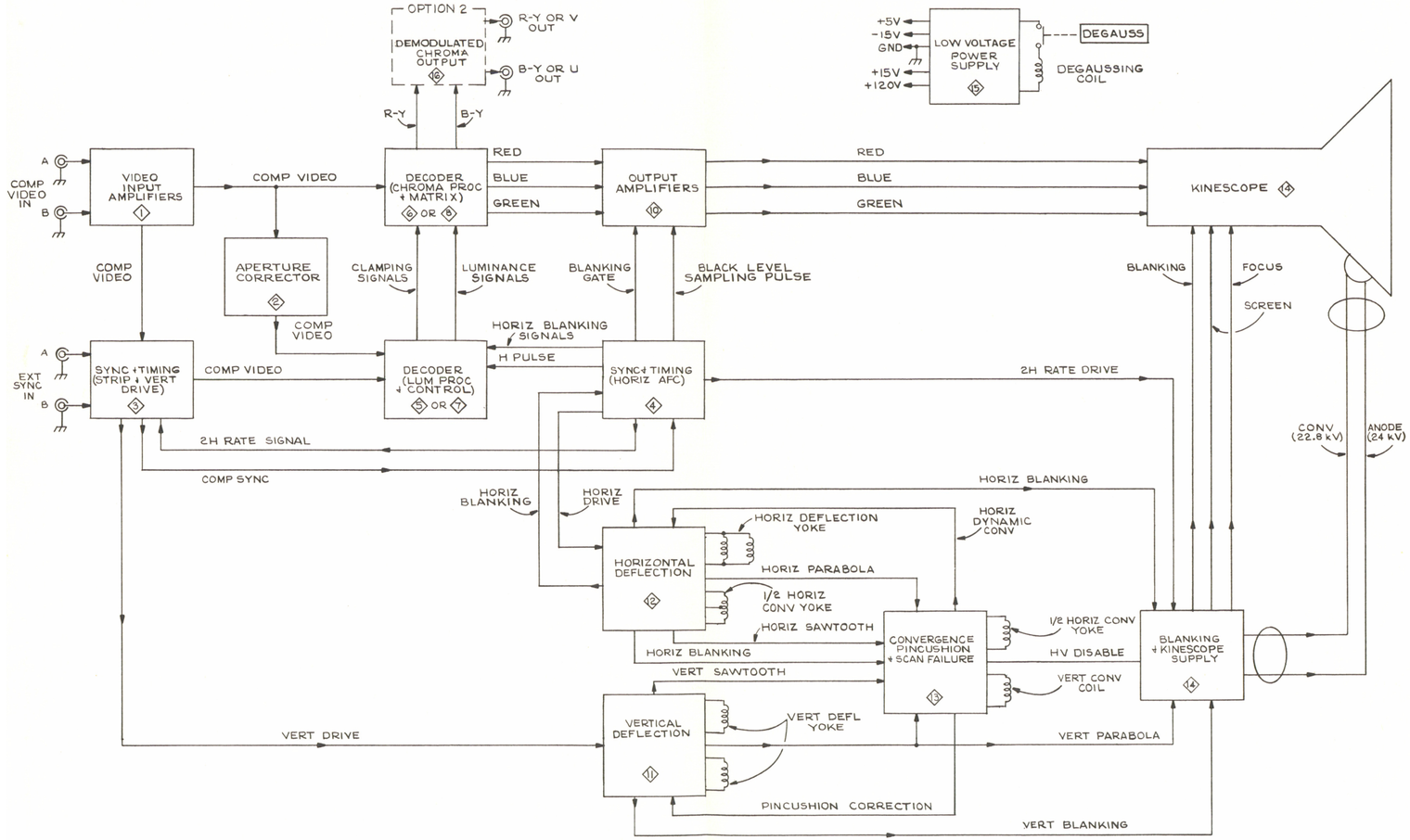
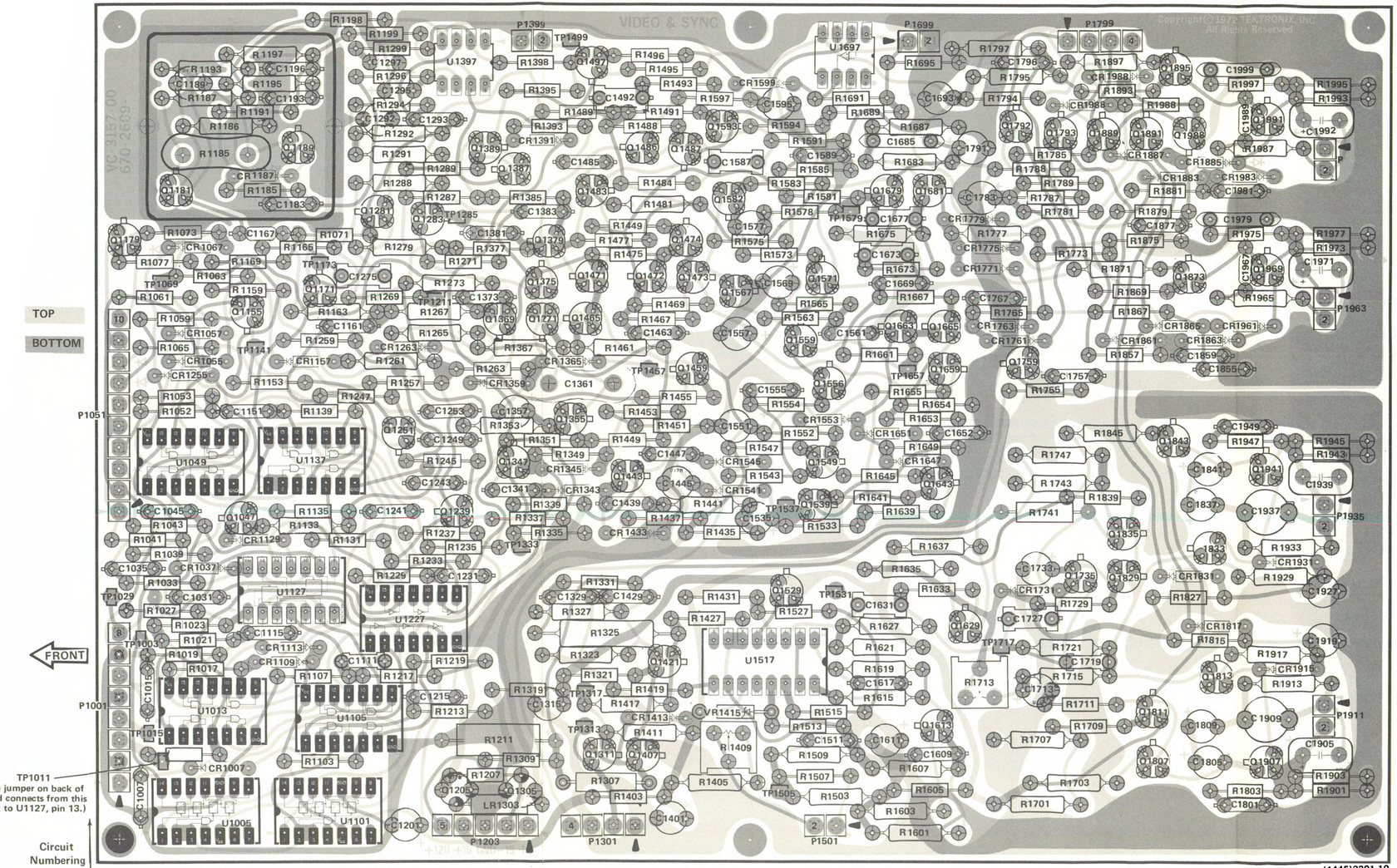

OPTION 2
DEMODULATED CHROMA OUTPUT
16
R-Y OR V OUT
B-Y OR U OUT
R-Y
B-Y
+5V
-15V
GND
+15V
+12.0V
LOW VOLTAGE POWER SUPPLY
15
DEGAUSS
DEGAUSSING COIL
A
COMP VIDEO IN
B
VIDEO INPUT AMPLIFIERS
1
COMP VIDEO
DECODER (CHROMA PROC + MATRIX)
6 OR 8
RED
BLUE
GREEN
OUTPUT AMPLIFIERS
10
RED
BLUE
GREEN
KINESCOPE
14
COMP VIDEO
APERTURE CORRECTOR
2
CLAMPING SIGNALS
LUMINANCE SIGNALS
BLANKING GATE
BLACK LEVEL SAMPLING PULSE
BLANKING
FOCUS
SCREEN
COMP VIDEO
HORIZ BLANKING SIGNALS
H PULSE
A
EXT SYNC IN
B
SYNC + TIMING (STRIP + VERT DRIVE)
3
COMP VIDEO
DECODER (LUM PROC + CONTROL)
5 OR 7
SYNC + TIMING (HORIZ AFC)
4
2H RATE DRIVE
CONV (22.8 kV)
ANODE (24 kV)
2H RATE SIGNAL
COMP SYNC
HORIZ BLANKING
HORIZ DRIVE
HORIZ BLANKING
HORIZ DEFLECTION YOKE
HORIZ DYNAMIC CONV
HORIZONTAL DEFLECTION
12
HORIZ PARABOLA
1/2 HORIZ CONV YOKE
HORIZ SAWTOOTH
CONVERGENCE PINCUSHION + SCAN FAILURE
13
1/2 HORIZ CONV YOKE
HV DISABLE
BLANKING + KINESCOPE SUPPLY
14
HORIZ BLANKING
VERT SAWTOOTH
VERT CONV COIL
VERTICAL DEFLECTION
11
VERT DEFL YOKE
VERT DRIVE
VERT PARABOLA
PINCUSHION CORRECTION
VERT BLANKING

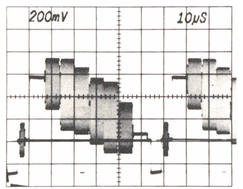


A2 VIDEO INPUT & SYNC CIRCUIT BOARD

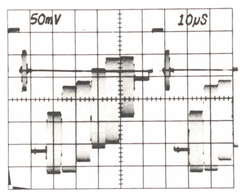
(1445)2201-10

WAVEFORMS

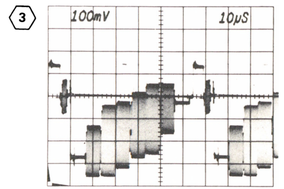
1

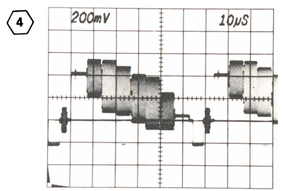


Probe ground connected to P1935-1

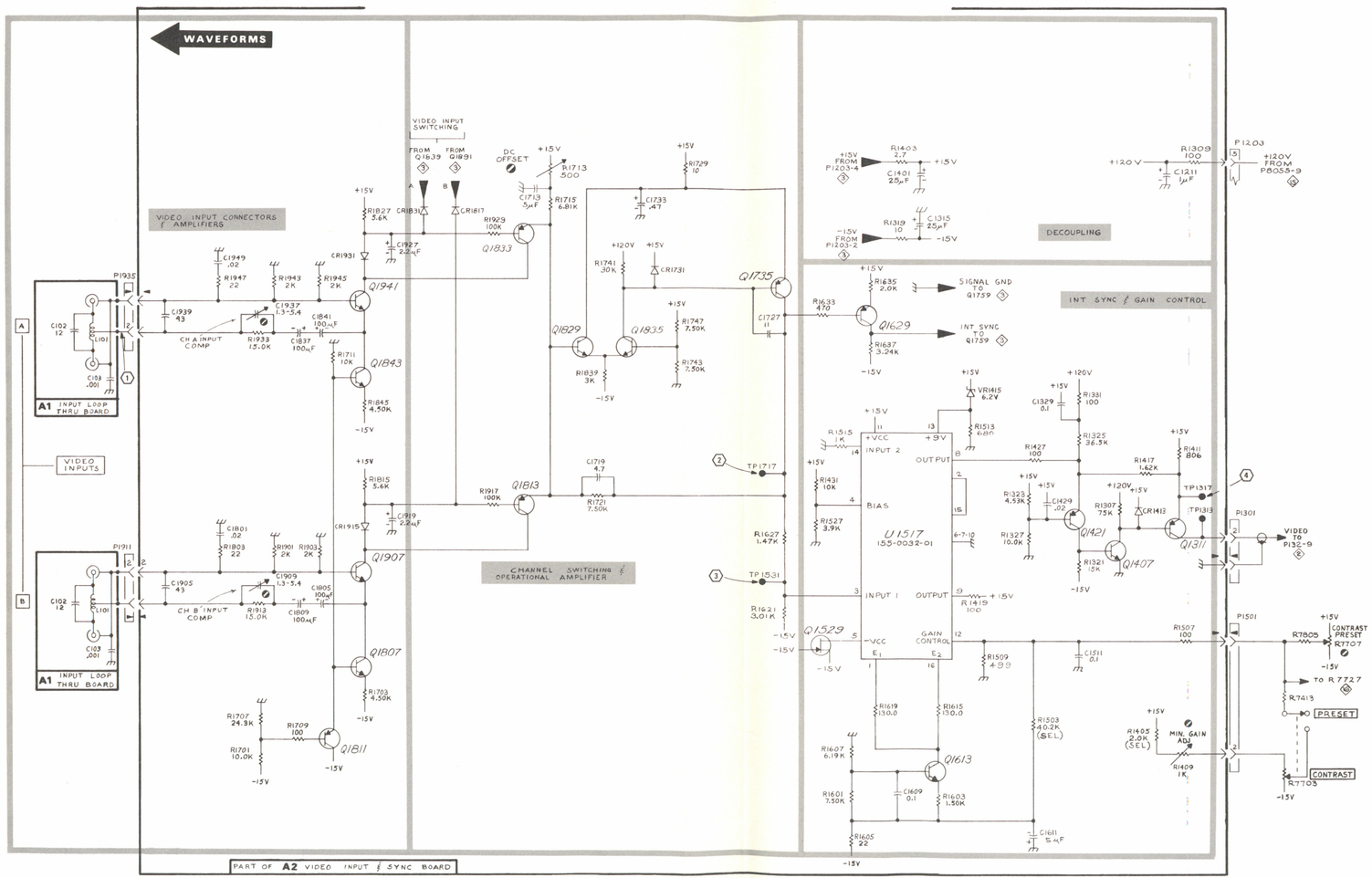


AC COUPLED





AC COUPLED



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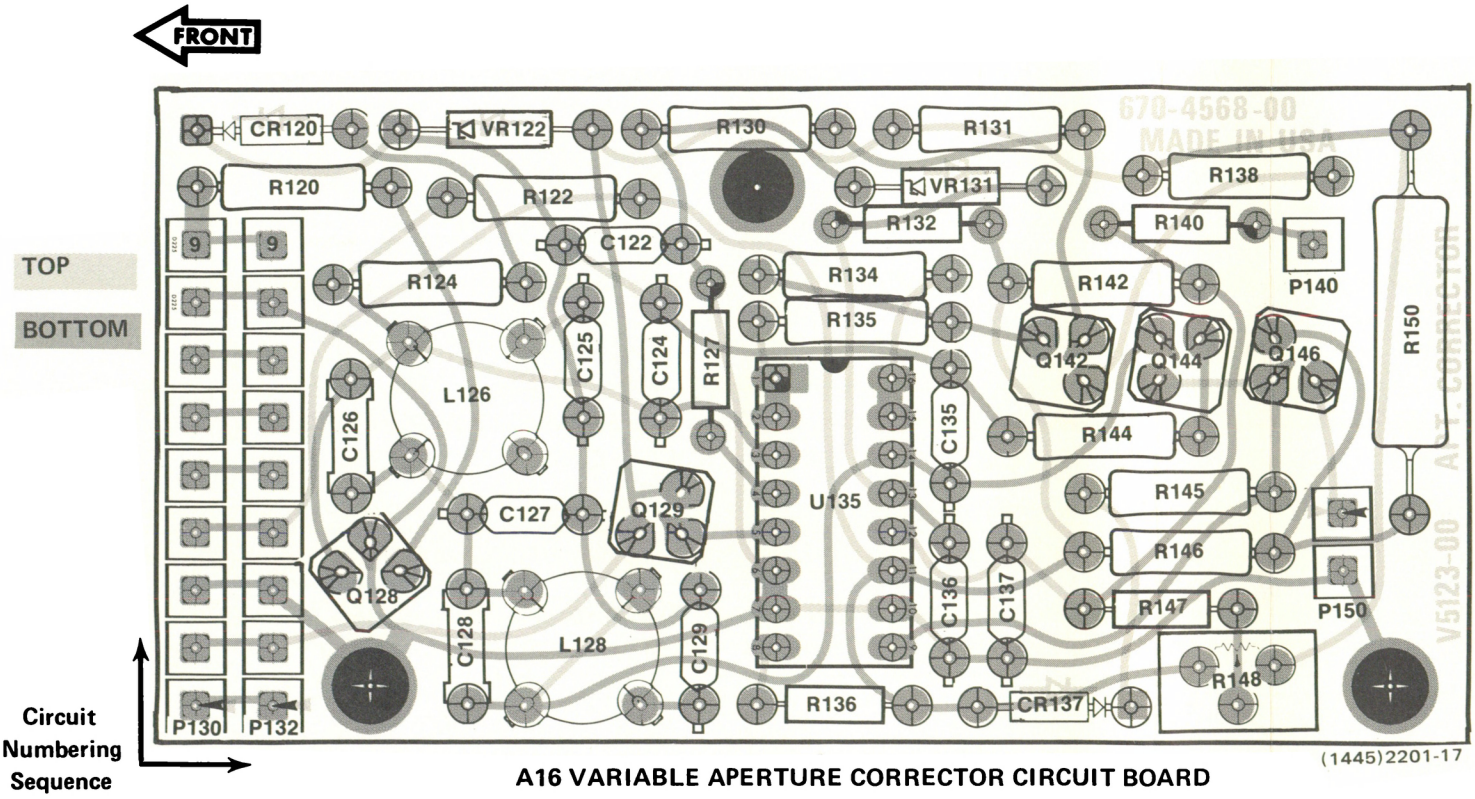
VIDEO INPUT AMPLIFIER 1

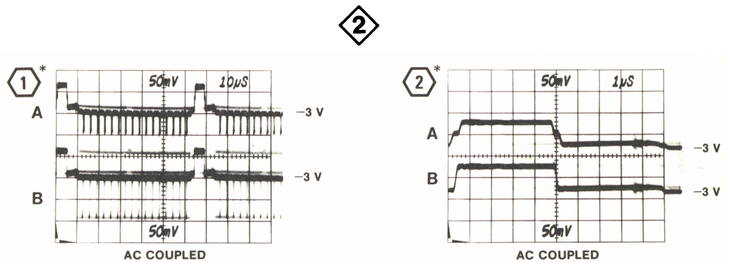
JWL 6/73



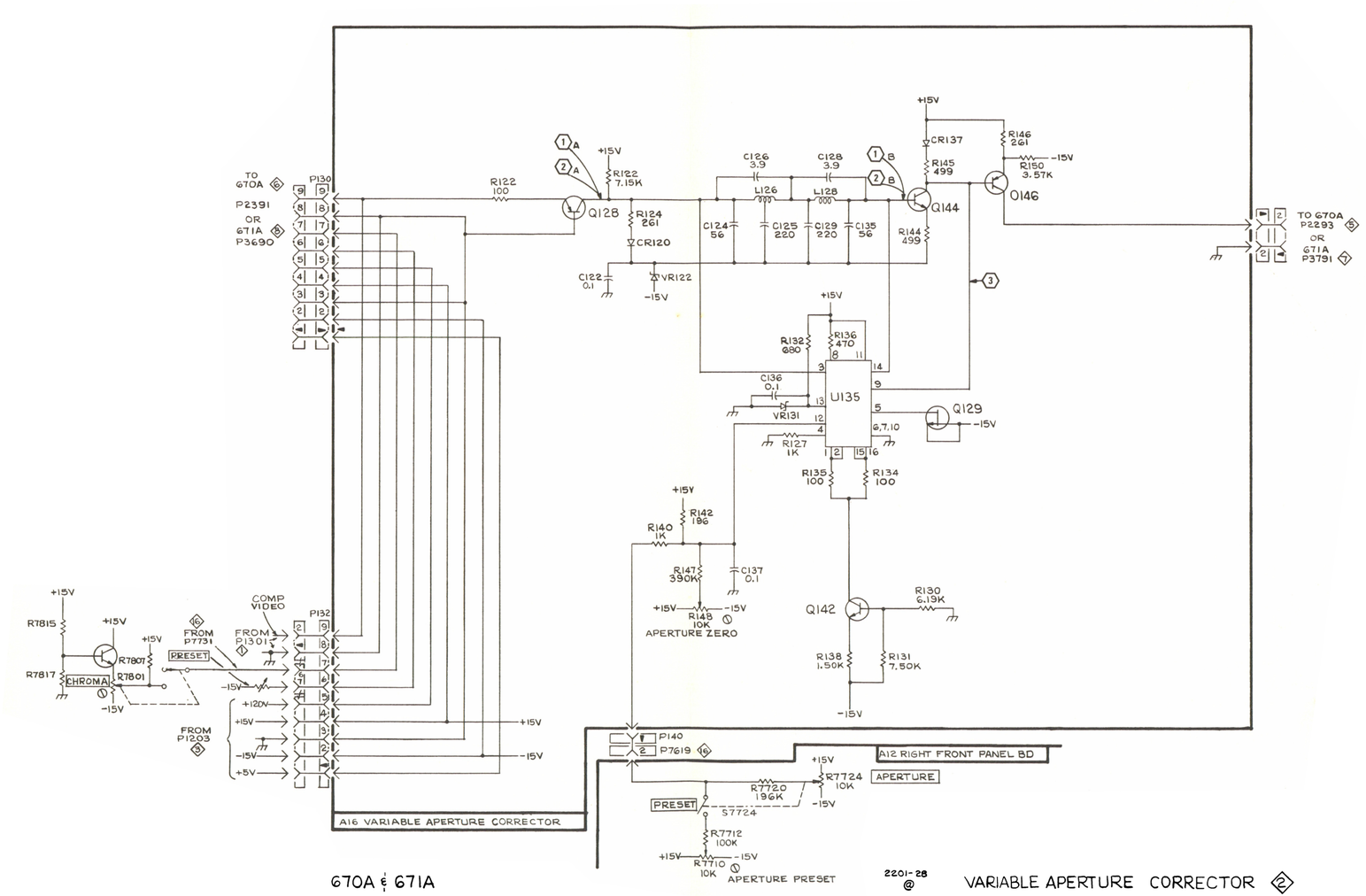
A16 VARIABLE APERTURE CORRECTOR CIRCUIT BOARD

@

Waveform conditions are given on back of first foldout page.



*NTSC crosshatch signal applied to picture monitor.



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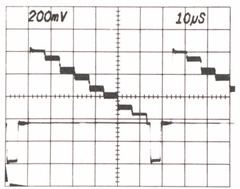
2201-28

VARIABLE APERTURE CORRECTOR 2

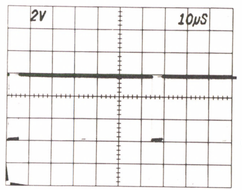
3

1



AC COUPLED

3



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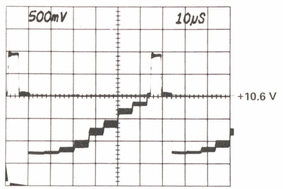
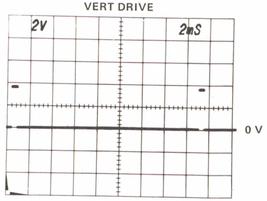
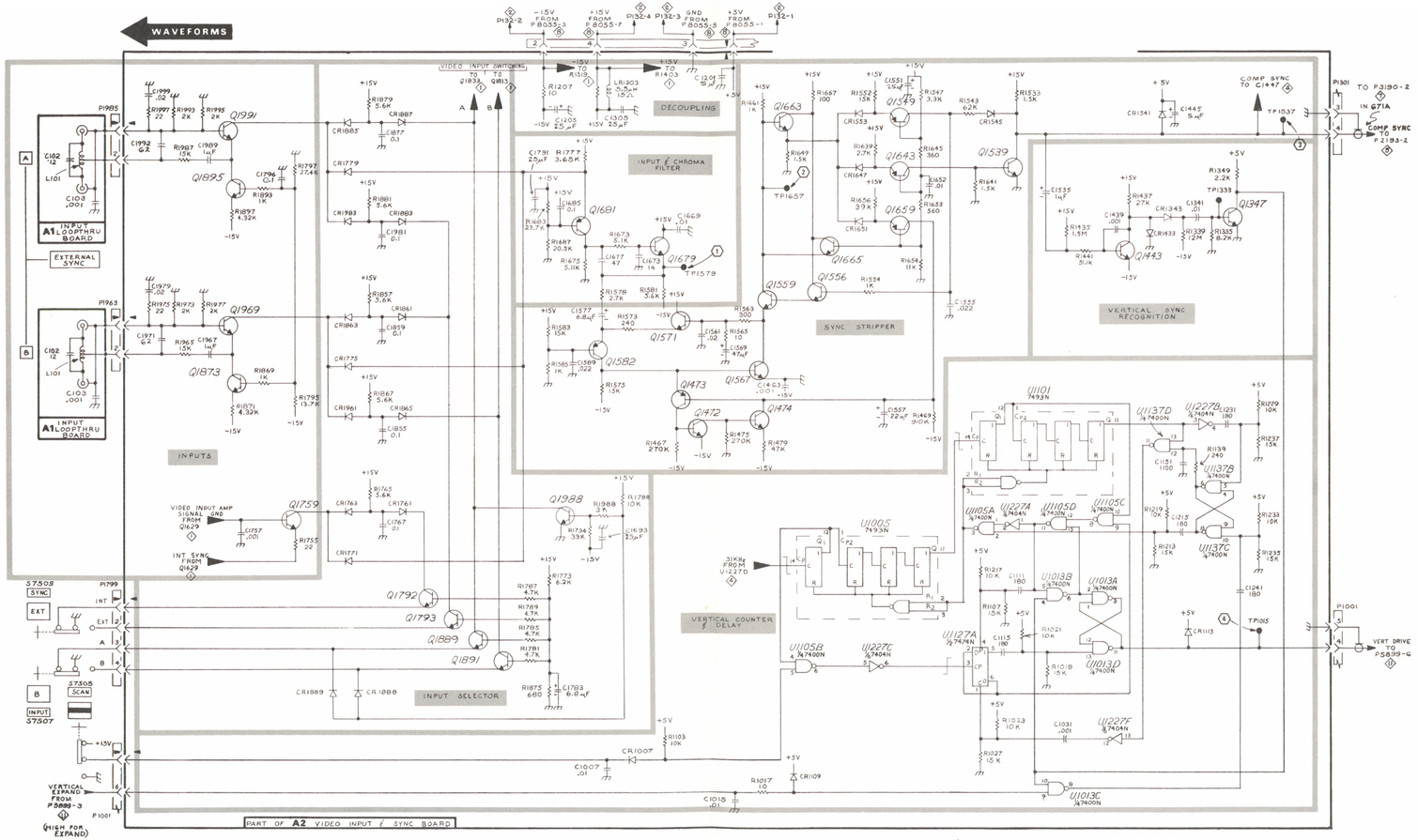


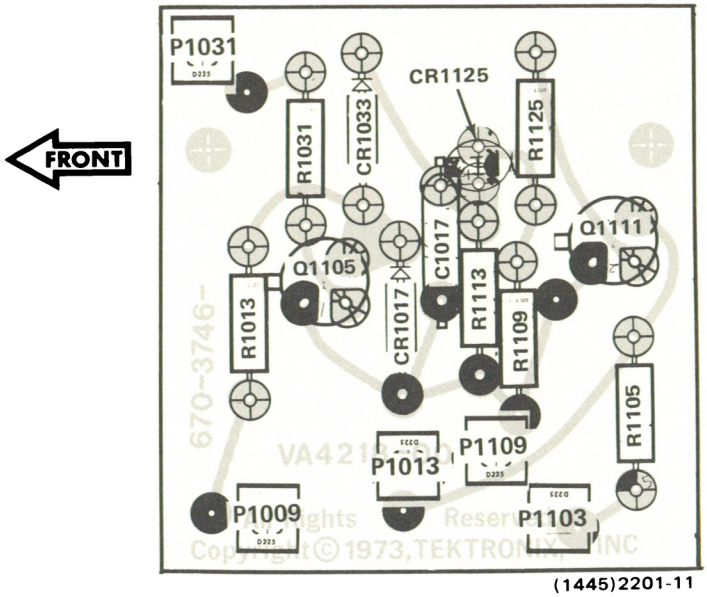
AC COUPLED

4

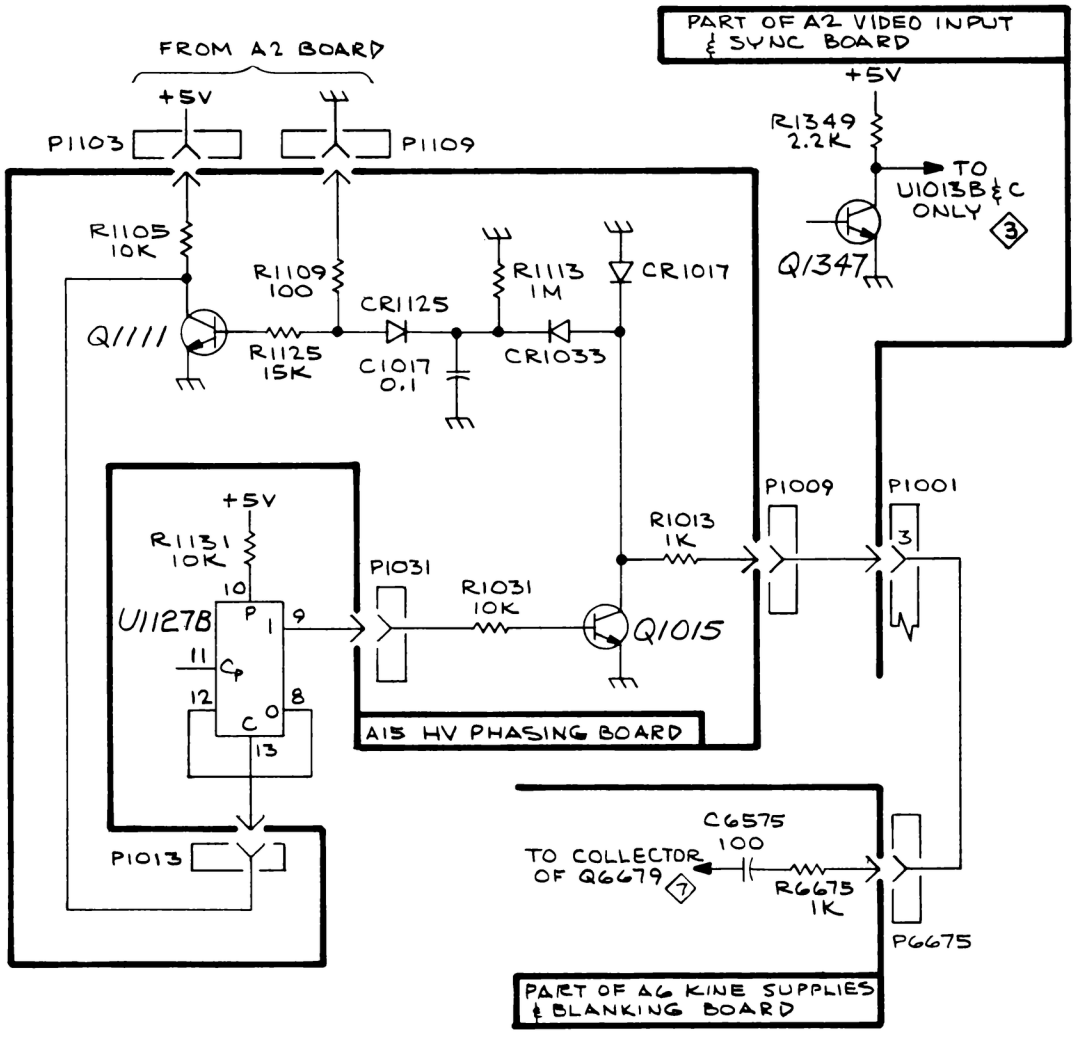
VERT DRIVE







A15 HV Phasing circuit board

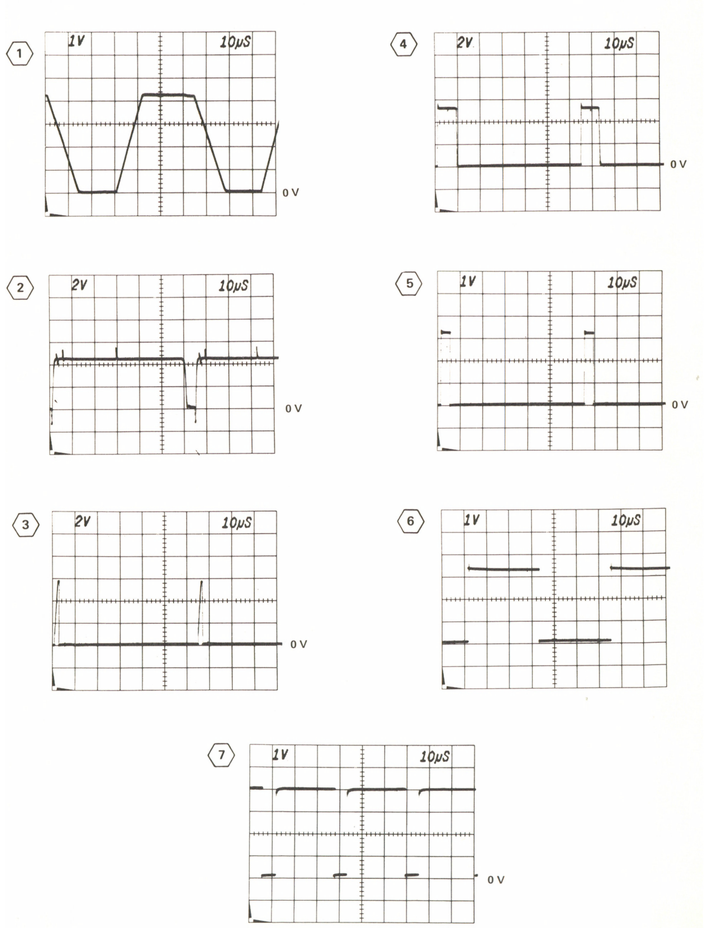


RH 974

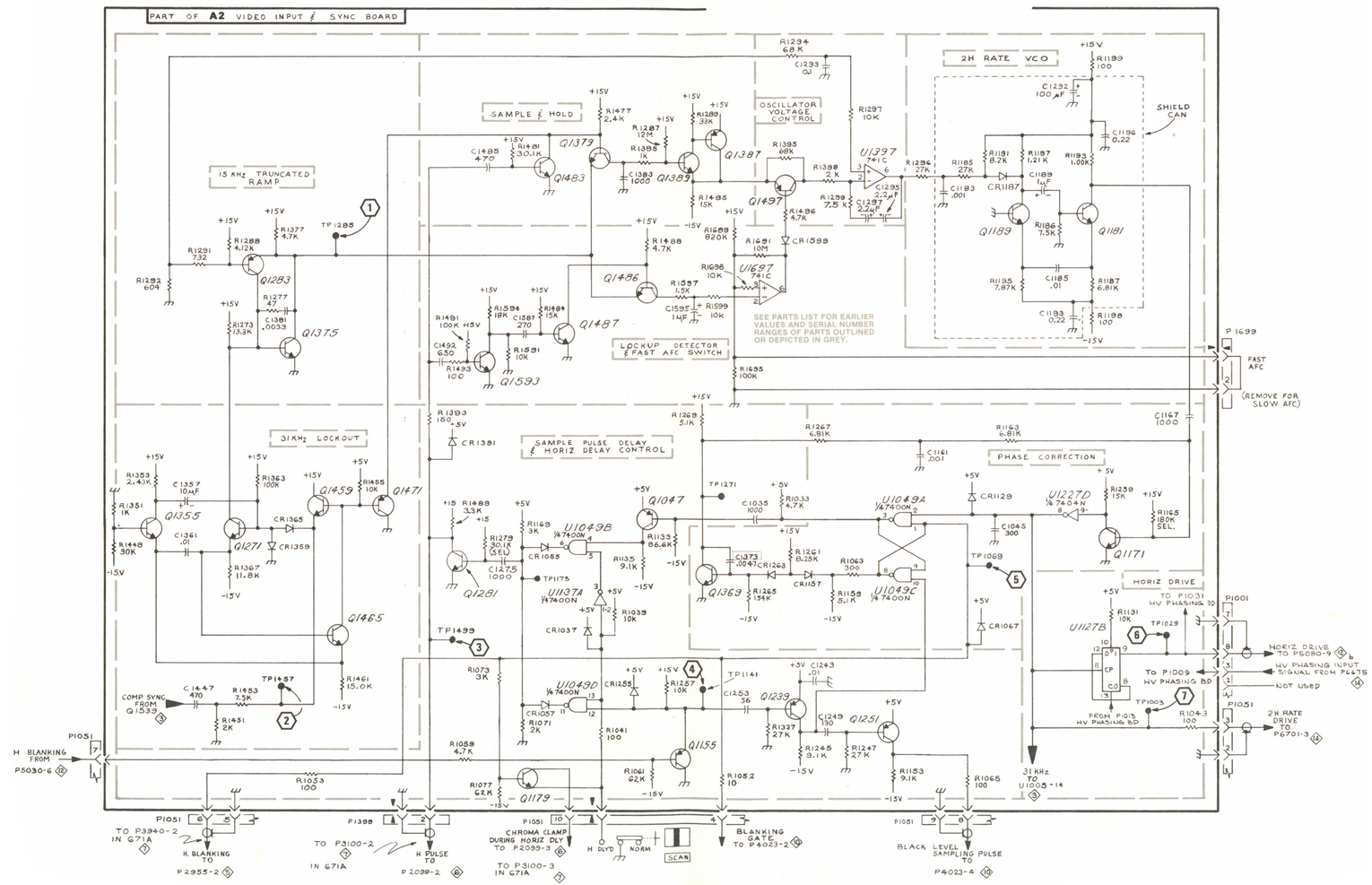
2201-30

670A & 671A @ HV PHASING BOARD

4



WAVEFORMS & HV PHASING BOARD WITH DIAGRAM (ON BACK SIDE OF PRECEDING FOLDOUT PAGE)



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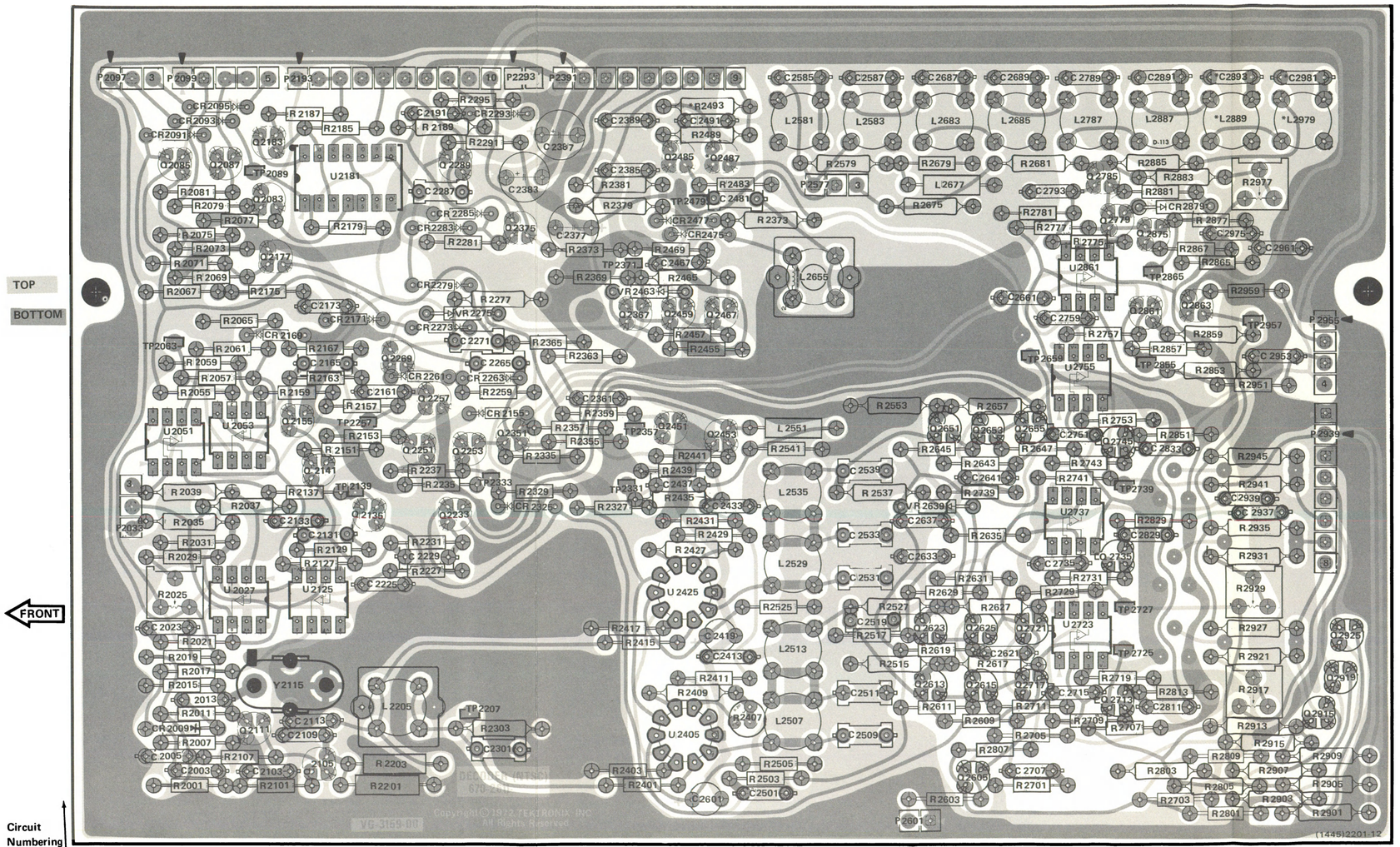
REV A, FEB 1979

SYNC & TIMING (HORIZ AFC) 4

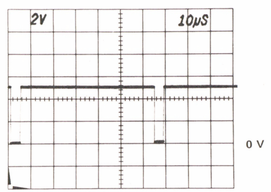


A3-1 NTSC DECODER CIRCUIT BOARD

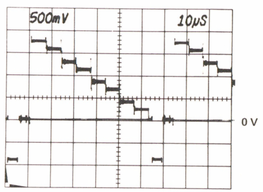
*See Parts List for serial number ranges.

5

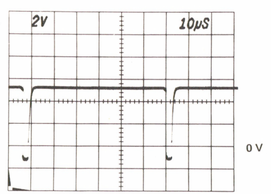
1 — 2V, 10µS — 0 V



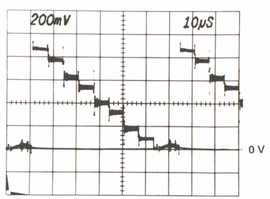
3 — 500mV, 10µS — 0 V



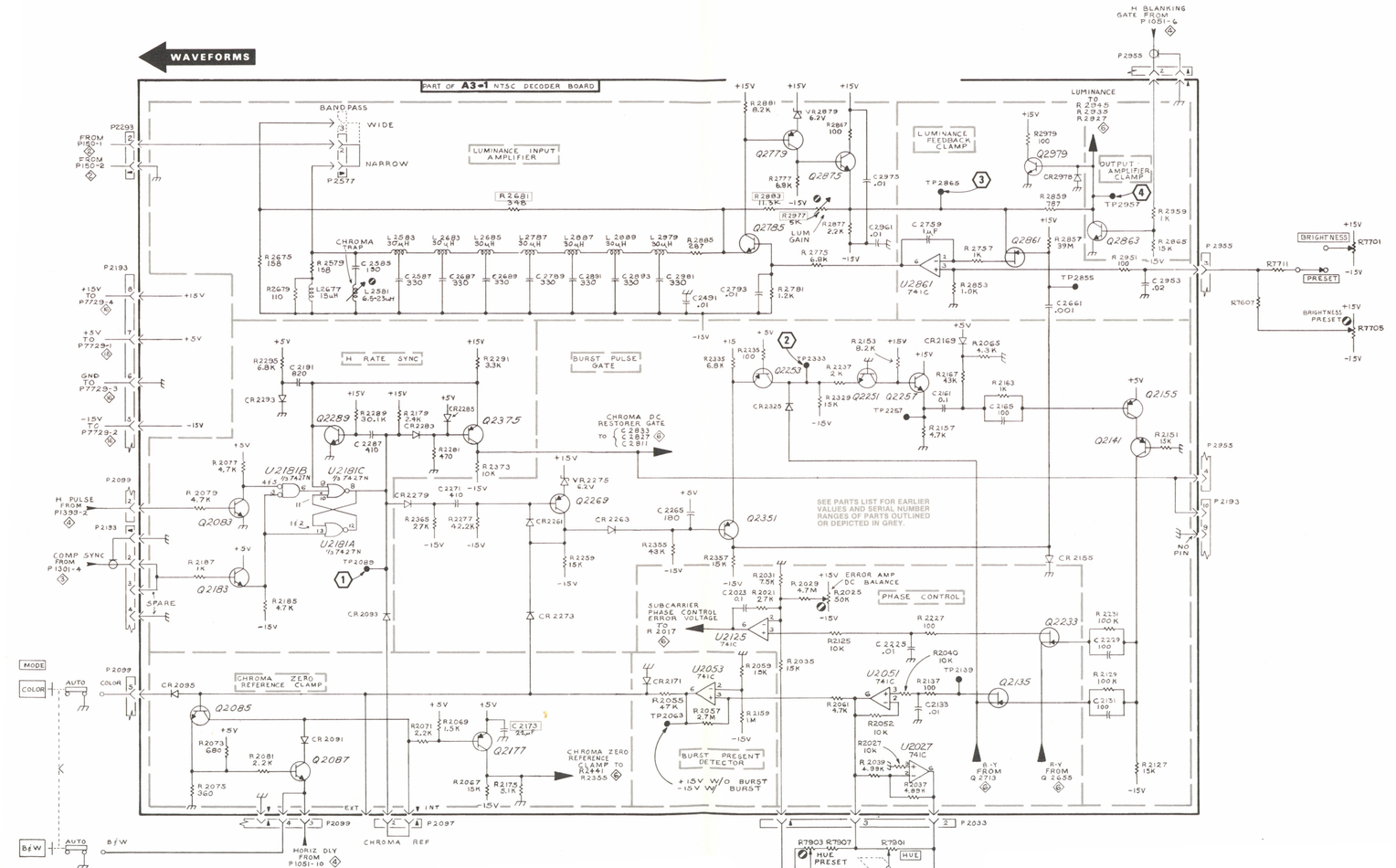
2 — 2V, 10µS — 0 V



4 — 200mV, 10µS — 0 V



WAVEFORMS



670A & 671A

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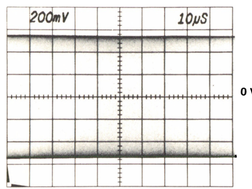
REV A, FEB 1979

NTSC DECODER (LUM PROC & CONTROL) 6/73 SWL

WAVEFORMS

6

1



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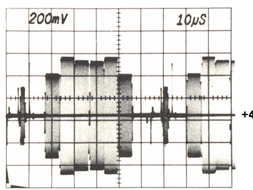

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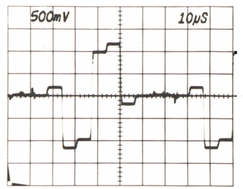

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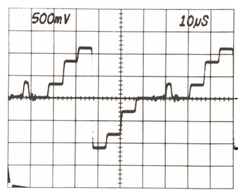

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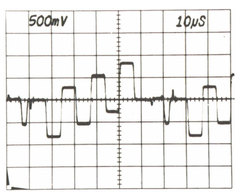
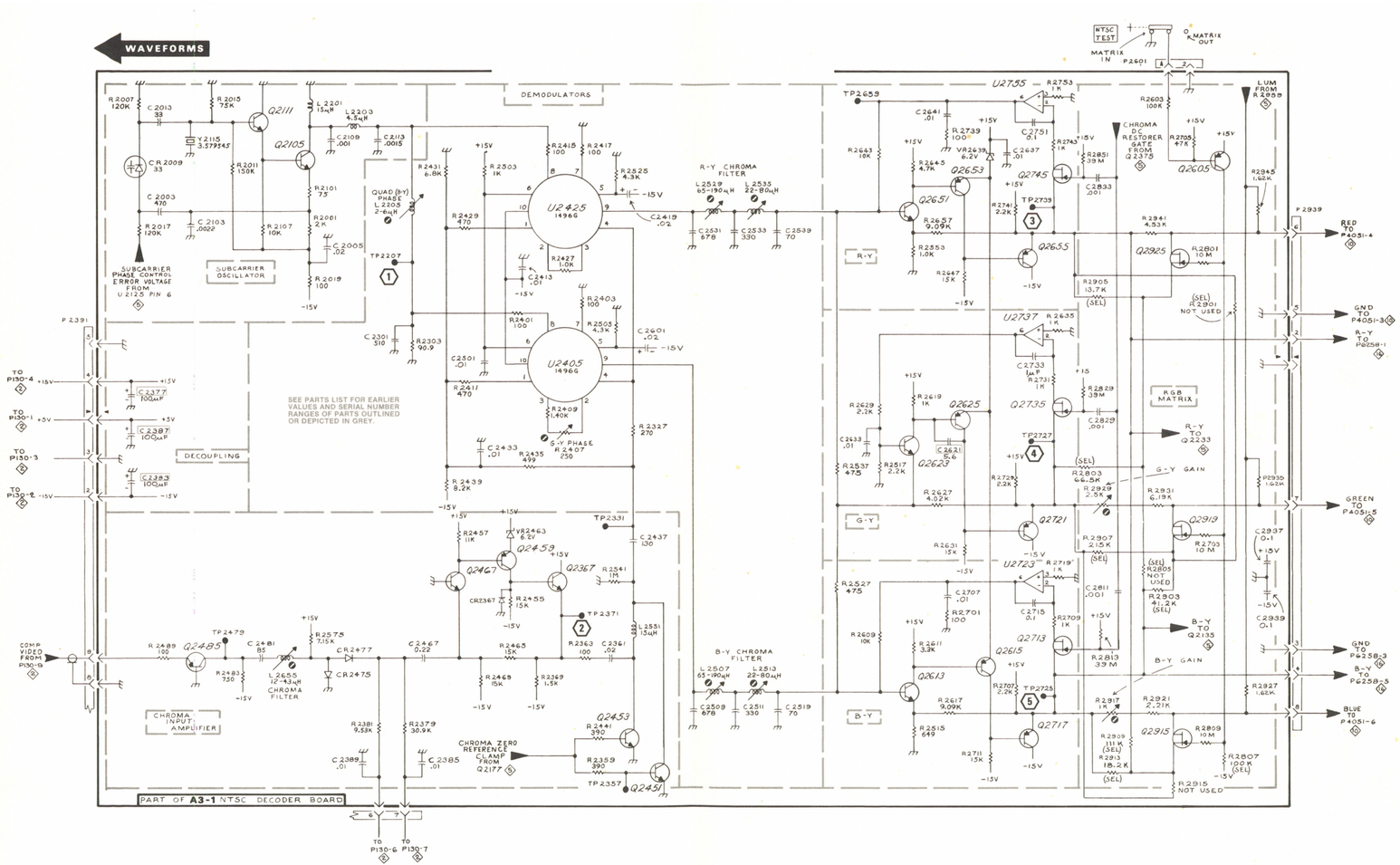
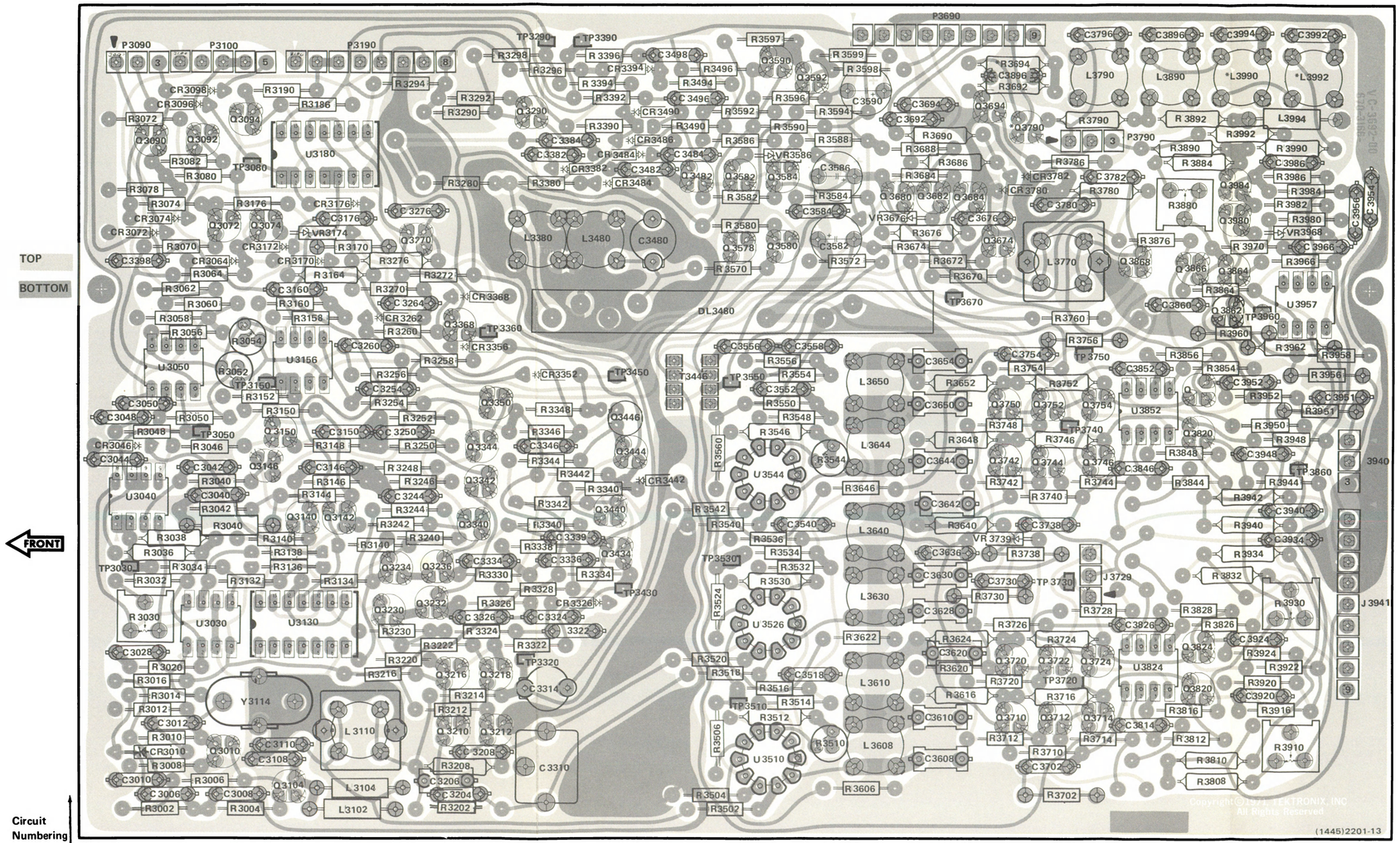






A3-2 PAL DECODER CIRCUIT BOARD
A3-3 PAL M DECODER CIRCUIT BOARD
(same circuit numbers as A3-2)

*See Parts List for serial number ranges.

@

7

1 1V 10μS 0 V

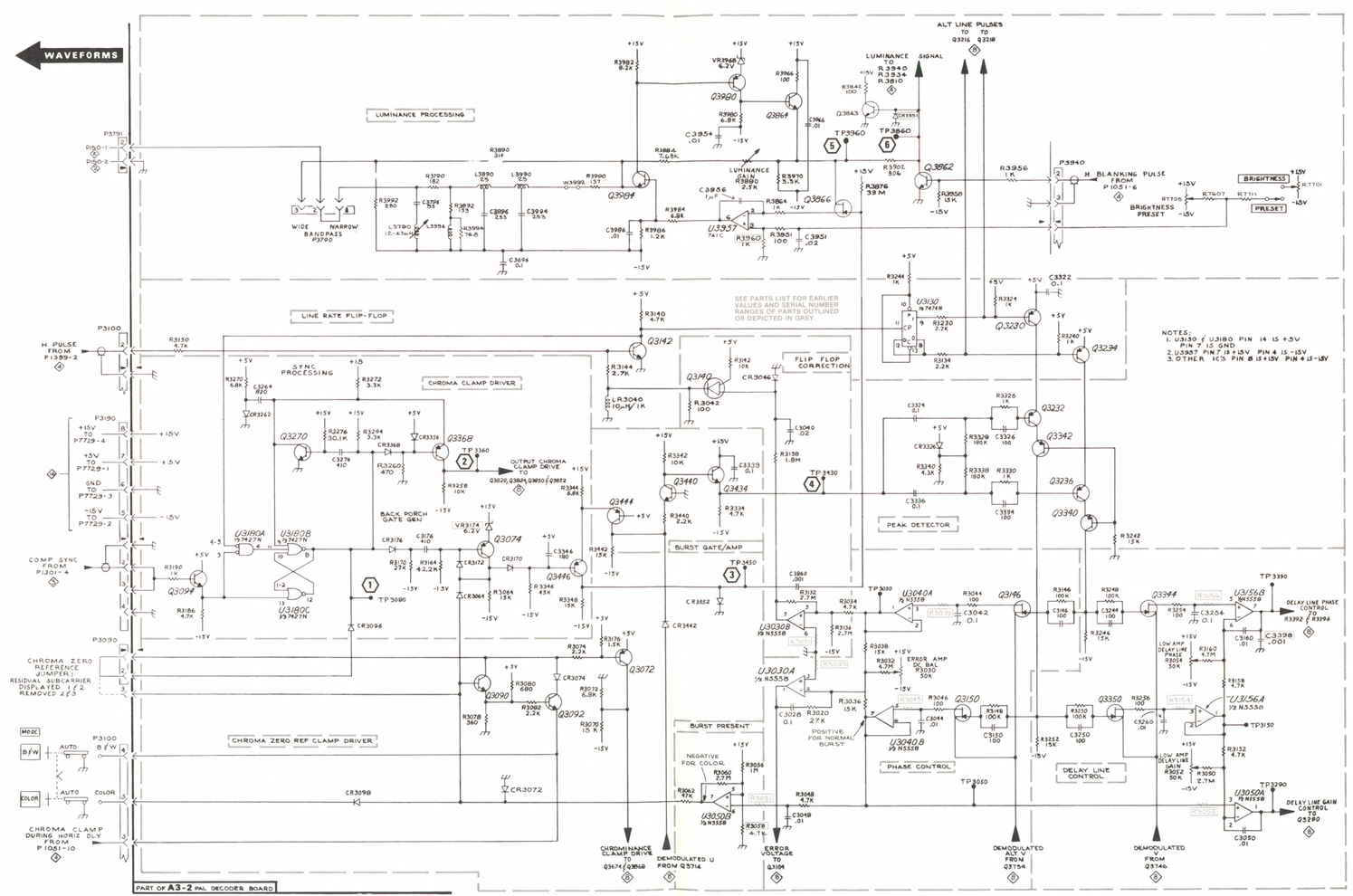
2 5V 10μS 0 V

3 5V 10μS 0 V

4 500mV 10μS +14 V

5 500mV 10μS

6 200mV 10μS 0 V


WAVEFORMS
LUMINANCE PROCESSING
LINE RATE FLIP-FLOP
SYNC PROCESSING
CHROMA CLAMP DRIVER
FLIP FLOP CORRECTION
BACK PORCH GATE GEN
BURST GATE/AMP
PEAK DETECTOR
CHROMA ZERO REF CLAMP DRIVER
BURST PRESENT
PHASE CONTROL
DELAY LINE CONTROL
ALT LINE PULSES TO Q3216, Q3218
LUMINANCE SIGNAL TO R3340, R3934, R3810
H BLANKING PULSE FROM P1051-6
BRIGHTNESS
PRESET
WIDE / NARROW BANDPASS P3990
H PULSE FROM P1399-2
COMP SYNC FROM P1301-4
CHROMA ZERO REFERENCE JUMPER: RESIDUAL SUBCARRIER DISPLAYED IF J2 REMOVED
MODE B/W AUTO COLOR AUTO
CHROMA CLAMP DURING HORIZ DLY FROM P1051-10
OUTPUT CHROMA CLAMP DRIVE TO Q3820, Q3824, Q3850, Q3872
CHROMINANCE CLAMP DRIVE TO Q3674, Q3868
DEMODULATED U FROM Q3714
ERROR VOLTAGE TO Q3104
DEMODULATED ALT V FROM Q3754
DEMODULATED FROM Q3746
DELAY LINE PHASE CONTROL TO R3392, R3396
DELAY LINE GAIN CONTROL TO Q3290
NEGATIVE FOR COLOR
POSITIVE FOR NORMAL BURST
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
NOTES:
1. U3130 & U3180 PIN 14 IS +5V PIN 7 IS GND
2. U3987 PIN 7 IS +5V PIN 4 IS -15V
3. OTHER ICS PIN 8 IS +5V PIN 4 IS -15V
PART OF A3-2 PAL DECODER BOARD

671A

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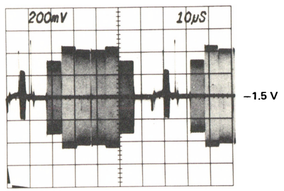
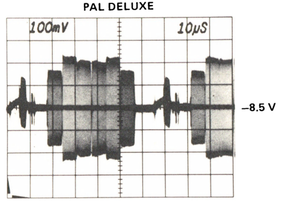
PAL DECODER (LUM PROC & CONTROL) 7 5/75 GEM

8

1


AC COUPLED
PAL DELUXE

2


AC COUPLED

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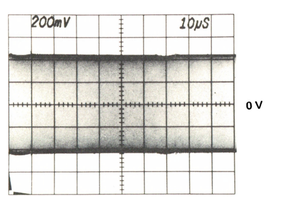

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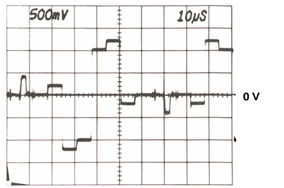

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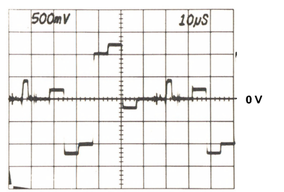

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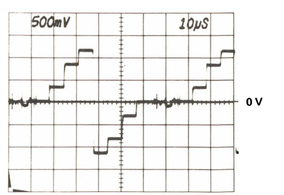

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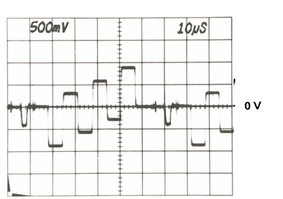
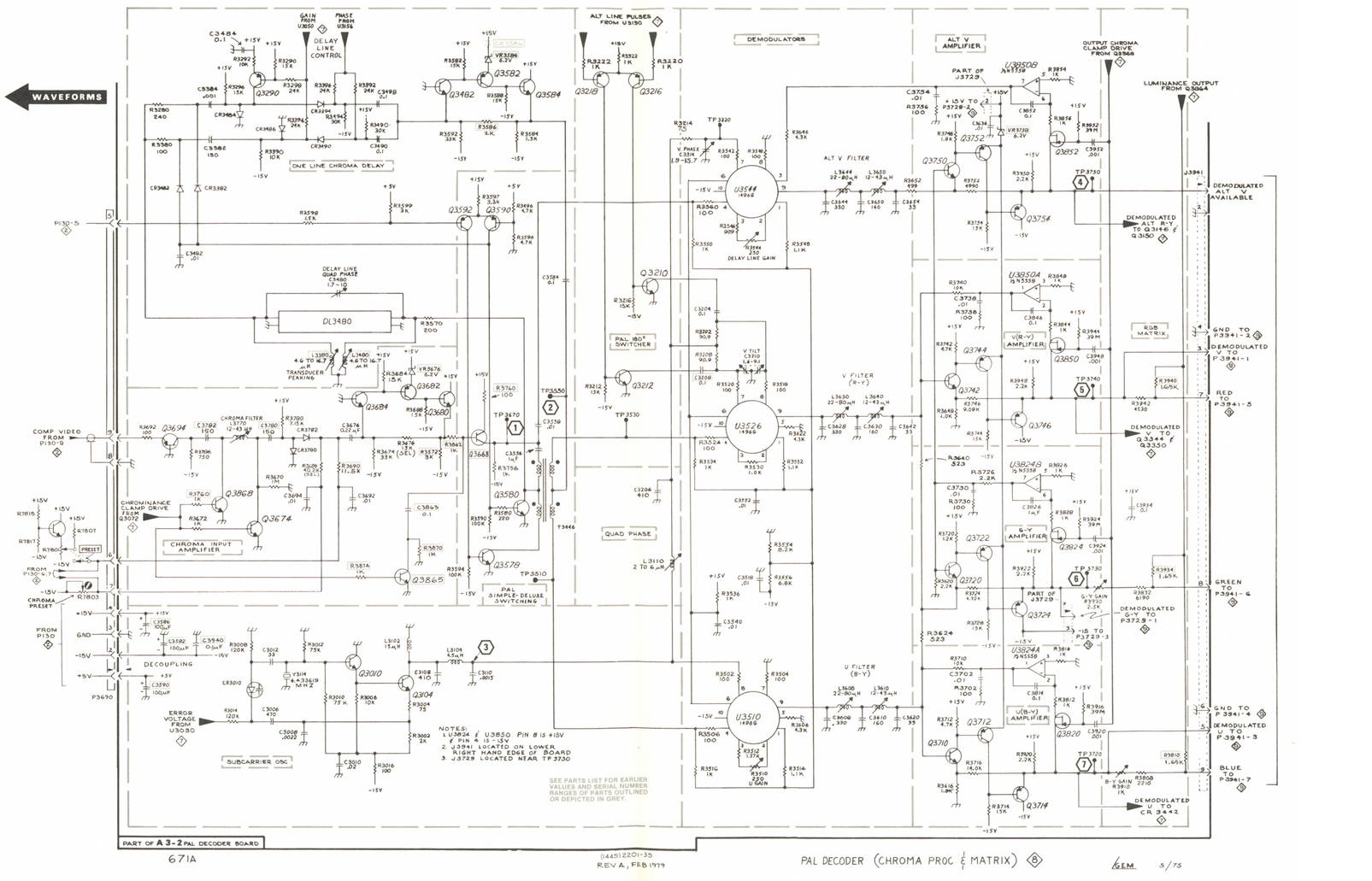
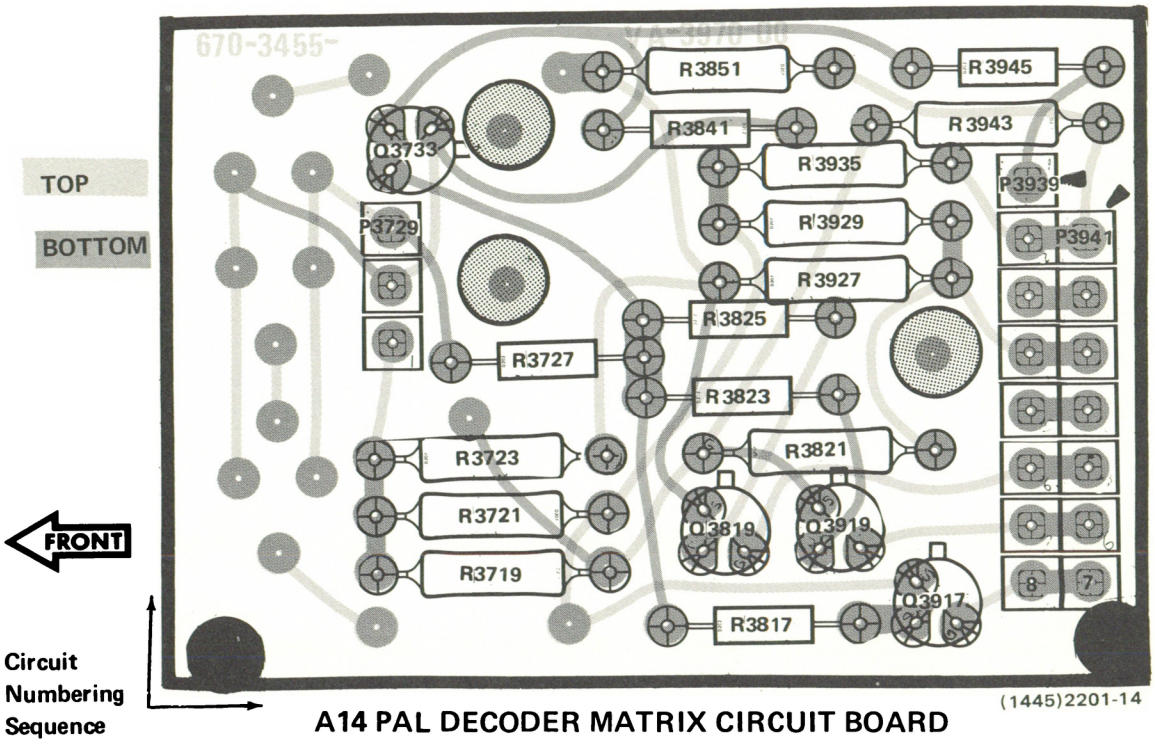
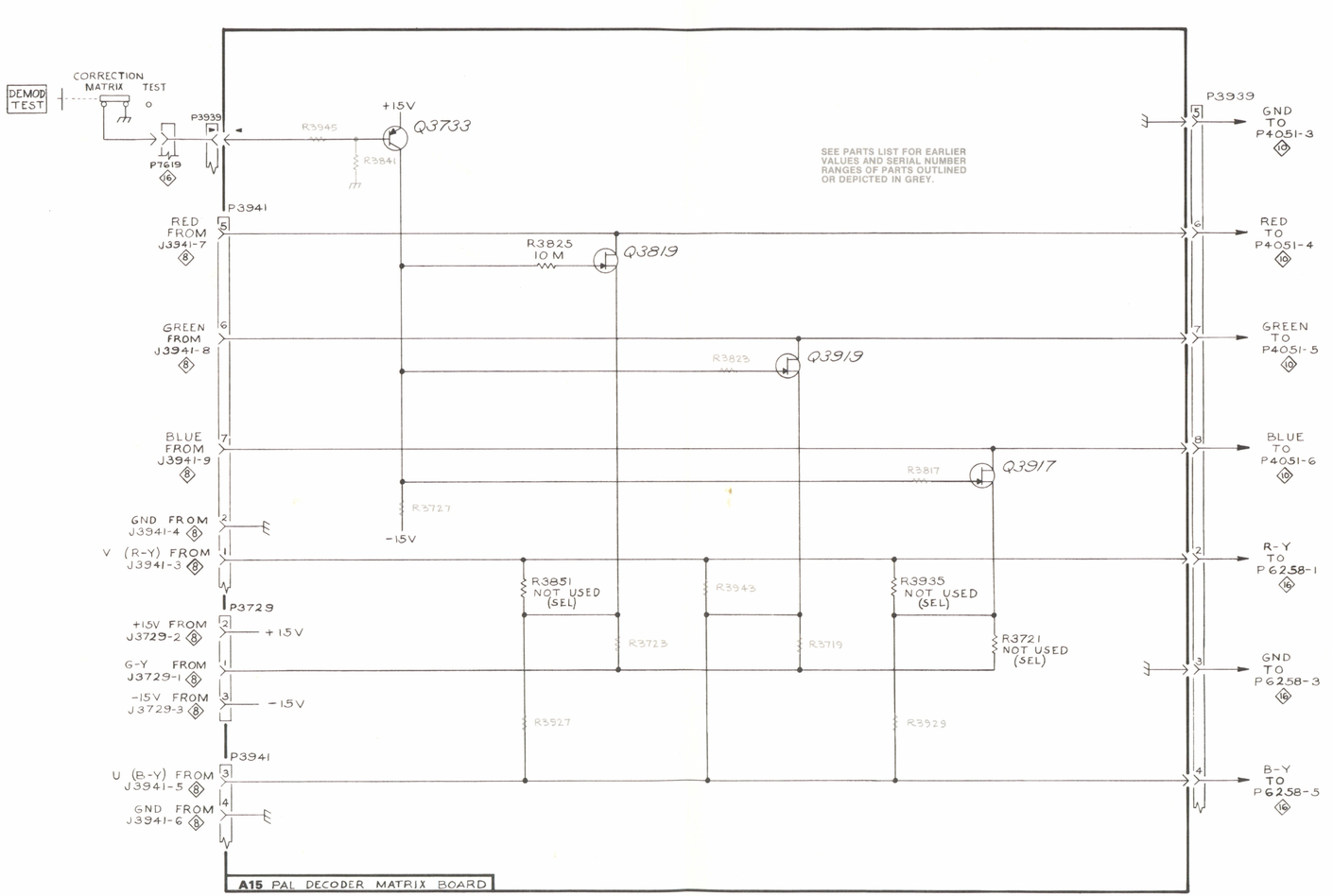






A14 PAL DECODER MATRIX CIRCUIT BOARD

@



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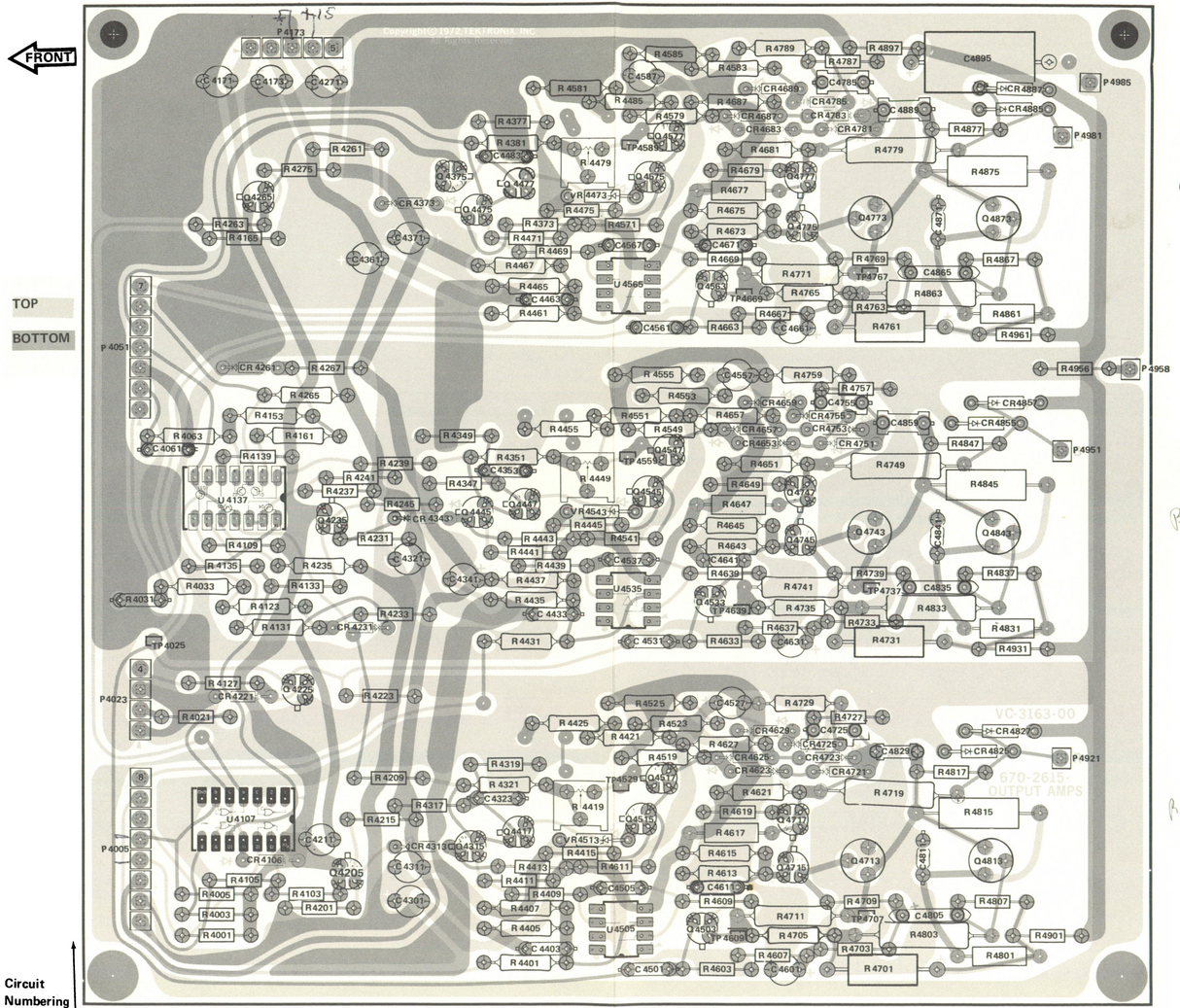
REV A, FEB 1979

PAL DECODER MATRIX 9 GEM 5/75



A4 OUTPUT AMPLIFIER CIRCUIT BOARD

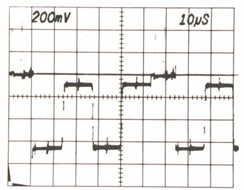
(1445)-2201-16

@

10

NTSC TEST pushbutton depressed

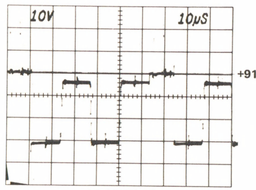
1



+1.35 V

AC COUPLED

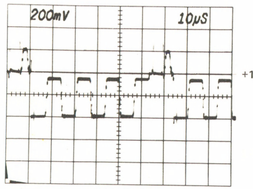
2



+91 V

AC COUPLED

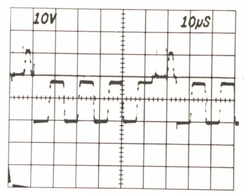
3



+1.4 V

AC COUPLED

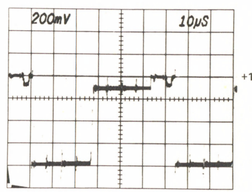
4



+84 V

AC COUPLED

5



+1.3 V

AC COUPLED

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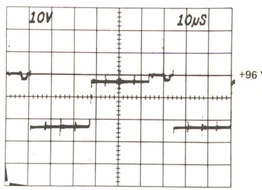

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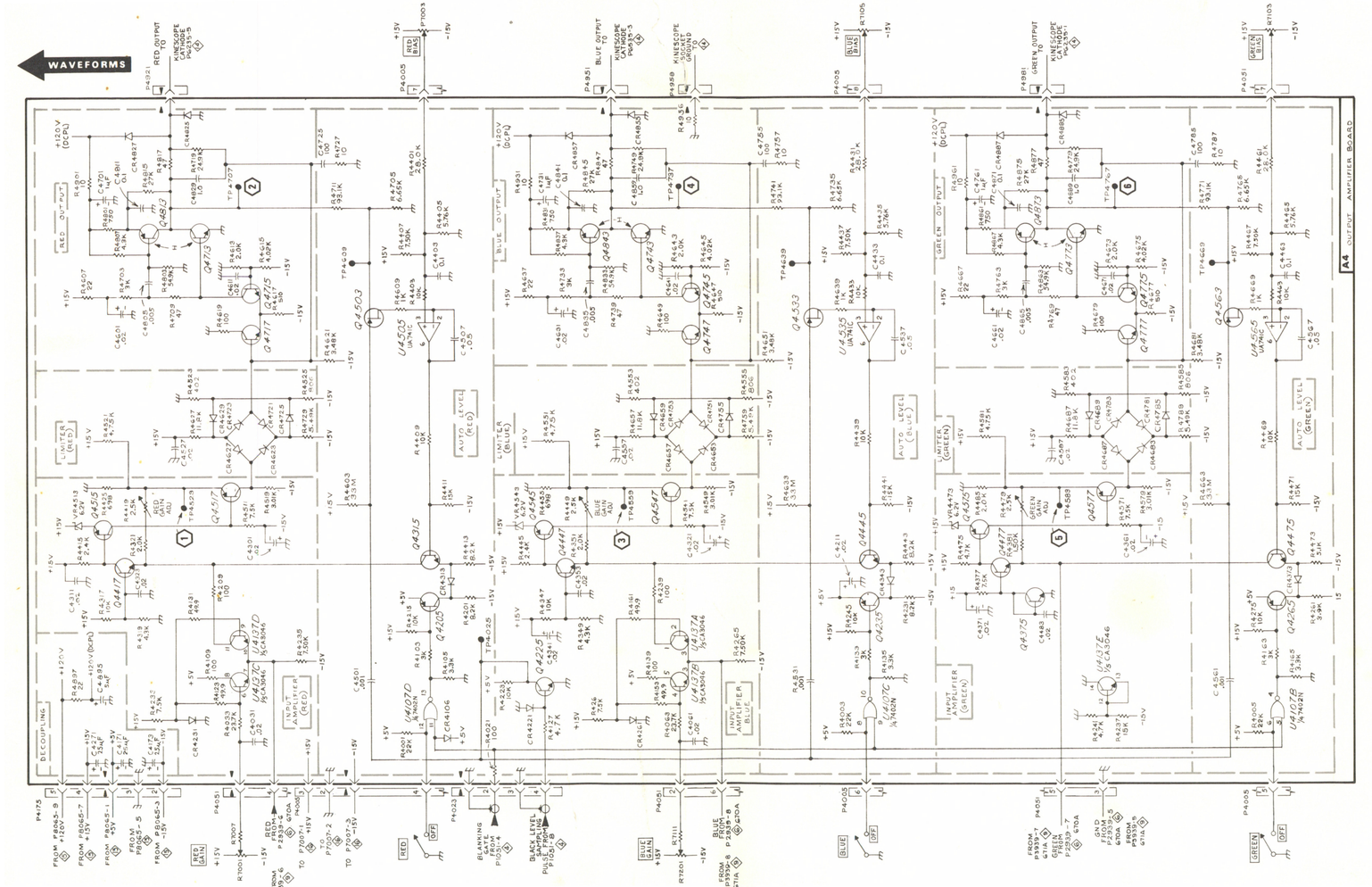

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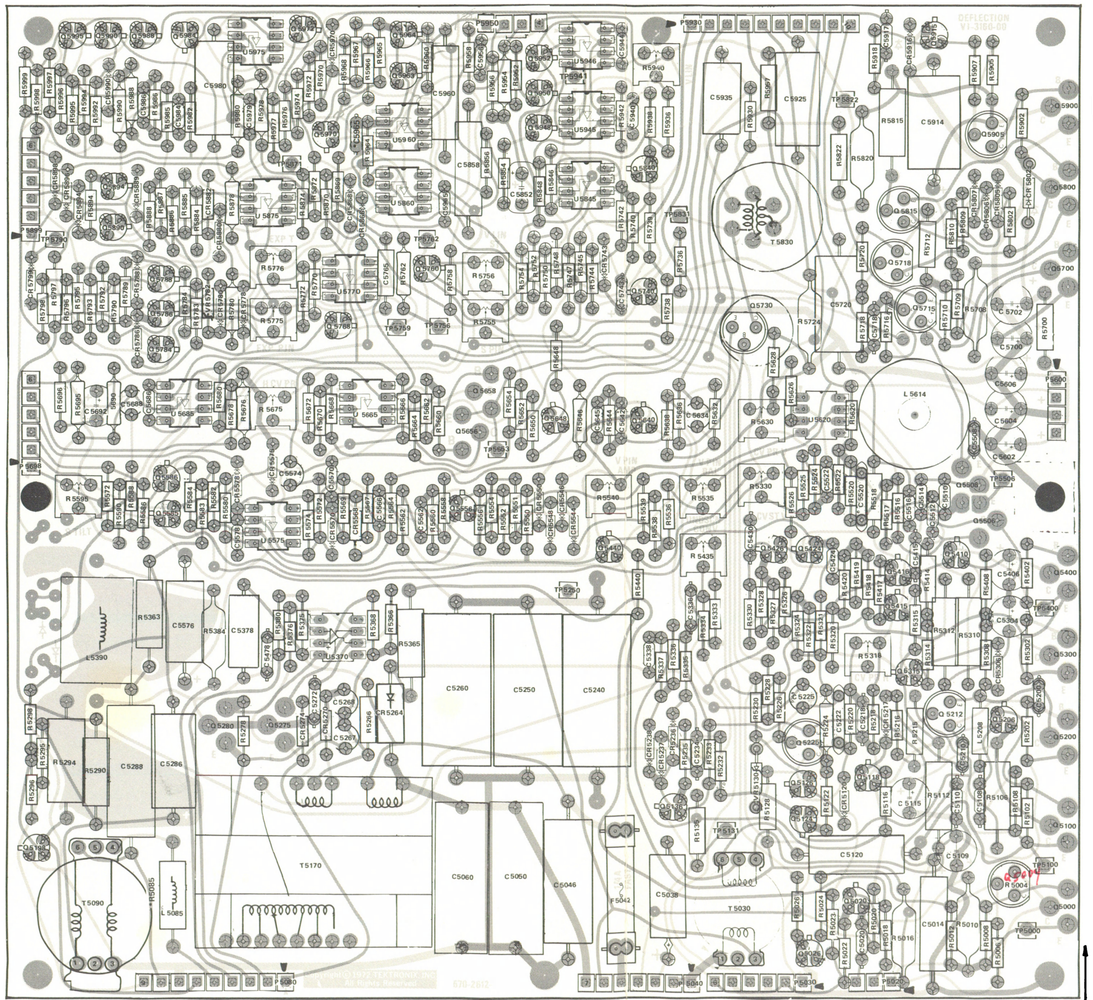
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1
VERT DRIVE
2V
5mS
0 V

2
VERT DRIVE
2V
5mS
0 V

3
VERT DRIVE
2V
5mS
0 V
Vert Delay pushbutton in.

4
VERT DRIVE
500mV
5mS
0 V

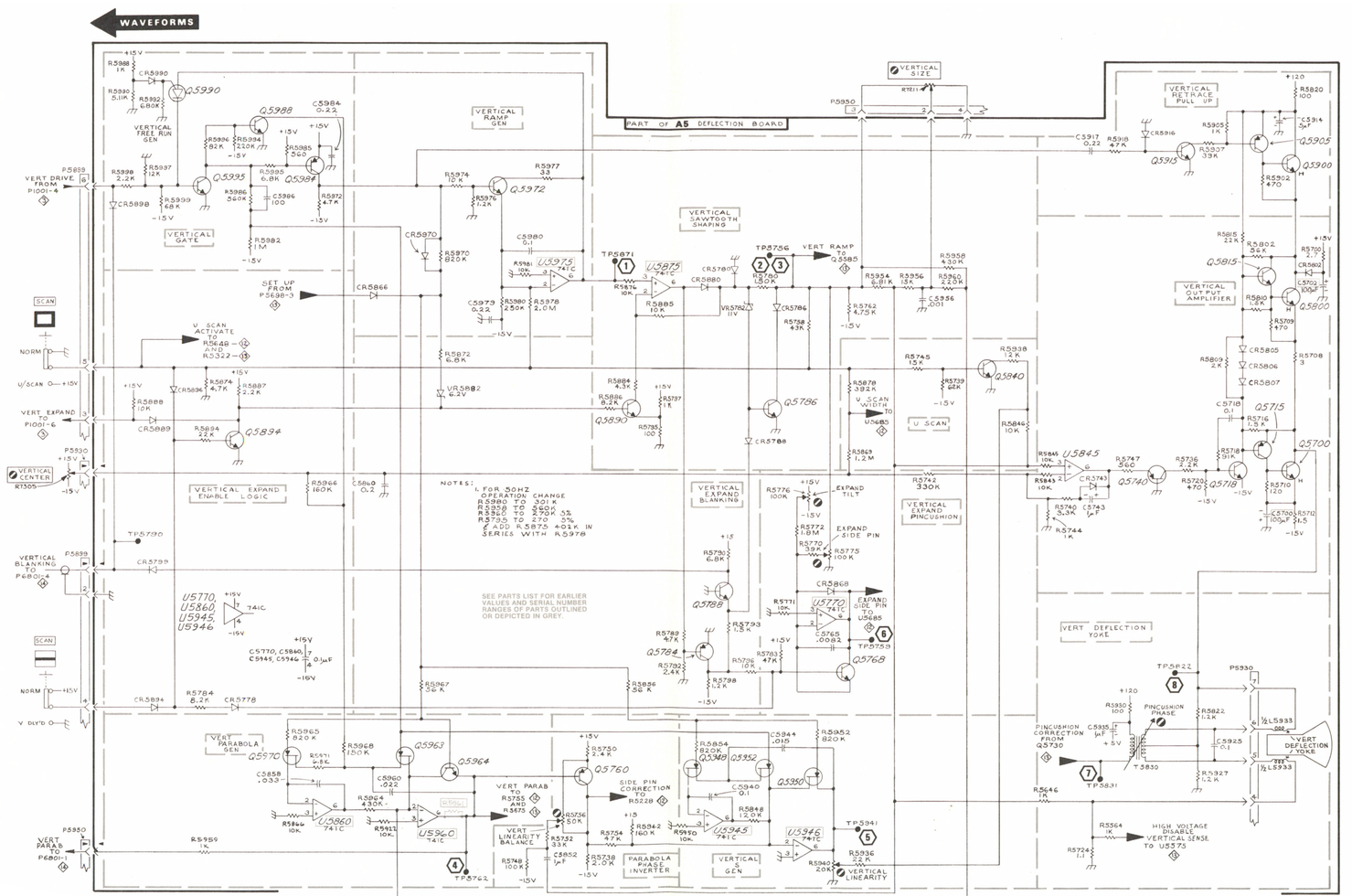
5
VERT DRIVE
500mV
5mS
0 V

6
VERT DRIVE
1V
5mS
0 V
Vert Delay pushbutton in.

7
VERT DRIVE
10V
5mS
+120 V
AC COUPLED

8
VERT DRIVE
50V
5mS
0 V

WAVEFORMS


PART OF A5 DEFLECTION BOARD
VERTICAL RAMP GEN
VERTICAL SAWTOOTH SHAPING
VERTICAL GATE
VERTICAL EXPAND ENABLE LOGIC
VERTICAL EXPAND BLANKING
VERTICAL EXPAND PINCUSHION
VERTICAL RETRACE PULL UP
VERTICAL OUTPUT AMPLIFIER
U SCAN
VERT DEFLECTION YOKE
VERT PARABOLA GEN
PARABOLA PHASE INVERTER
VERTICAL GEN
SIDE PIN CORRECTION
VERT LINEARITY BALANCE
PINCUSHION PHASE
HIGH VOLTAGE DISABLE VERTICAL SENSE TO U5573
VERTICAL LINEARITY
VERT RAMP TO Q5385
VERT DRIVE FROM P1001-4
VERTICAL BLANKING TO P6801-4
VERT EXPAND TO P1001-6
VERT PARAB TO P6801-1
U SCAN ACTIVATE TO R5648 AND R5322
SET UP FROM PS698-3
EXPAND TILT
EXPAND SIDE PIN
U5770, U5860, U5945, U5946
NOTES:
1. FOR 30HZ OPERATION CHANGE R5980 TO 301K R5958 TO 560K R5960 TO 270K 3% R5725 TO 270 & ADD R5875 402K IN SERIES WITH R5978
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

670A & 671A

(1445) 2201-58
REV A, FEB 1979

VERTICAL DEFLECTION 11

WAVEFORMS

1 — 20V, 10µS — 0 V

4 — 10V, 10µS — +70 V — AC COUPLED

VERT DRIVE

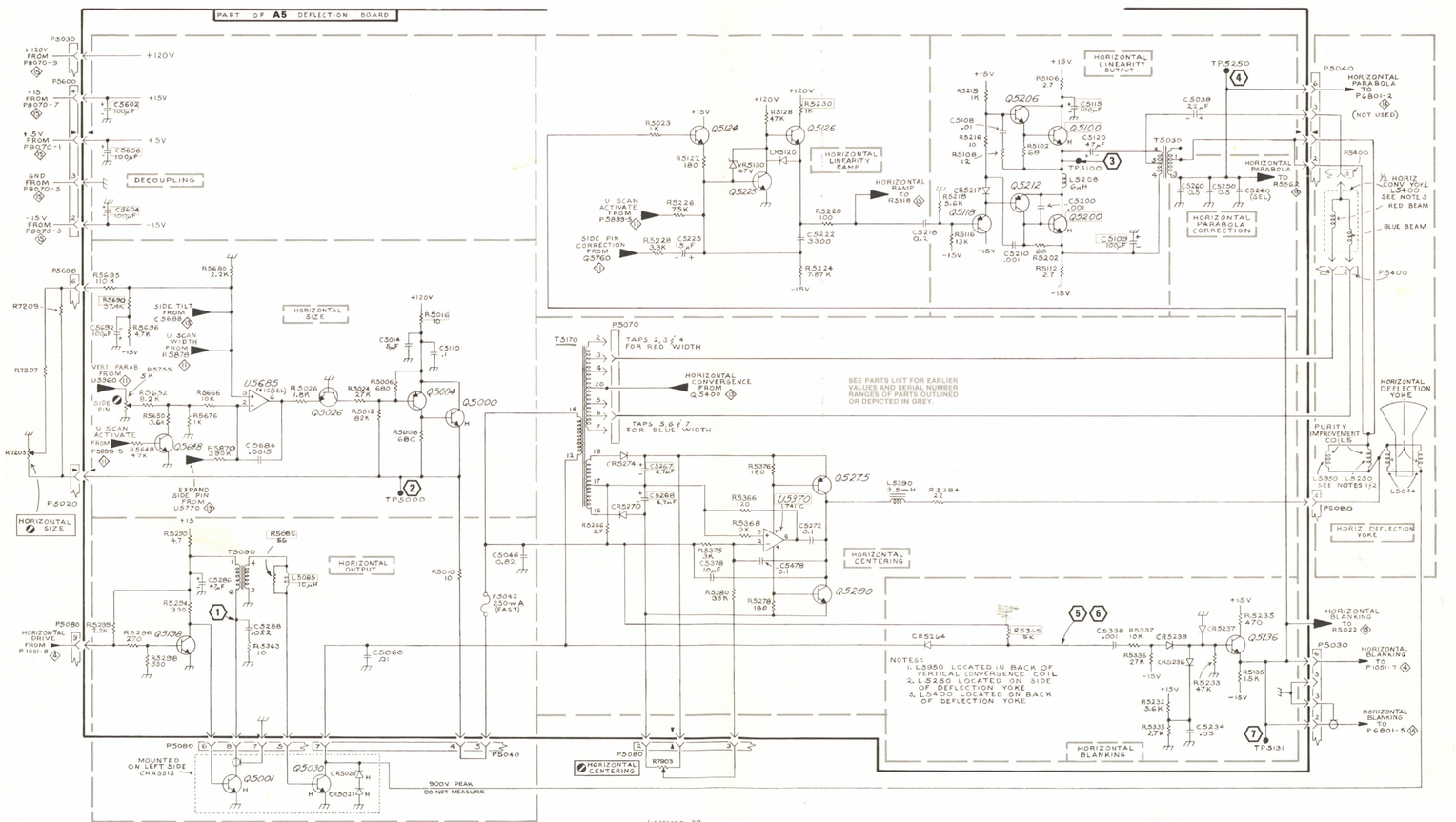
2 — 5V, 5mS — +72 V — AC COUPLED

5 — 20V, 10µS — 0 V

3 — 5V, 10µS — 0 V

6 — 1V, 10µS — 0 V

7 — 2V, 10µS — 0 V



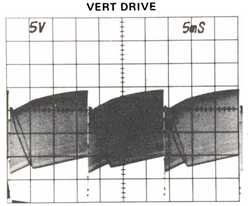
G70A & G71A

(1445)2201-39
REV A, FEB 1979

HORIZONTAL DEFLECTION 12 6/75

13

1 VERT DRIVE



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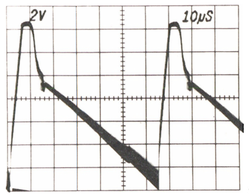
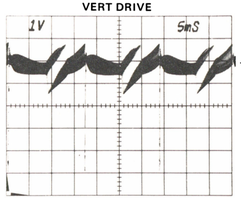
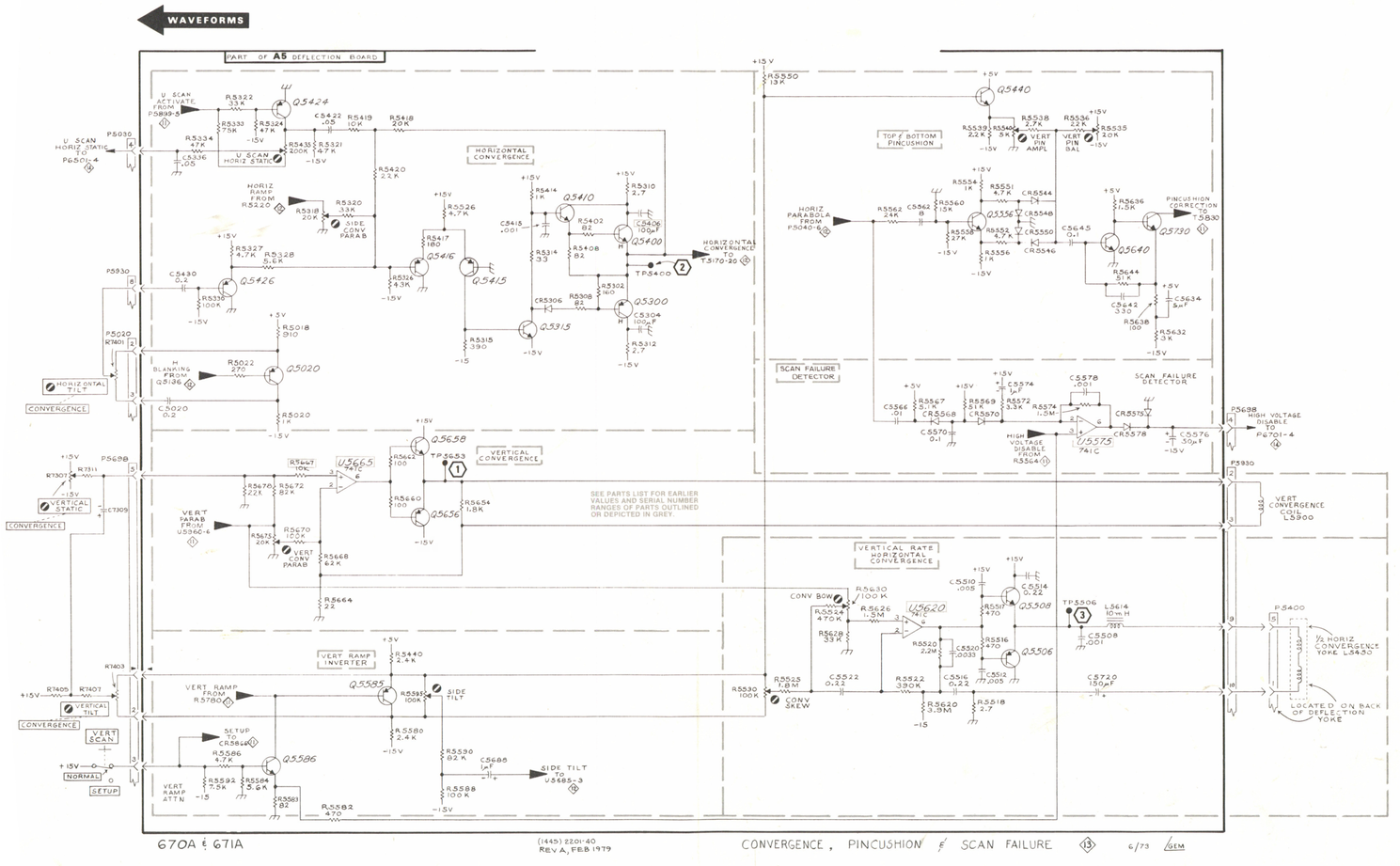
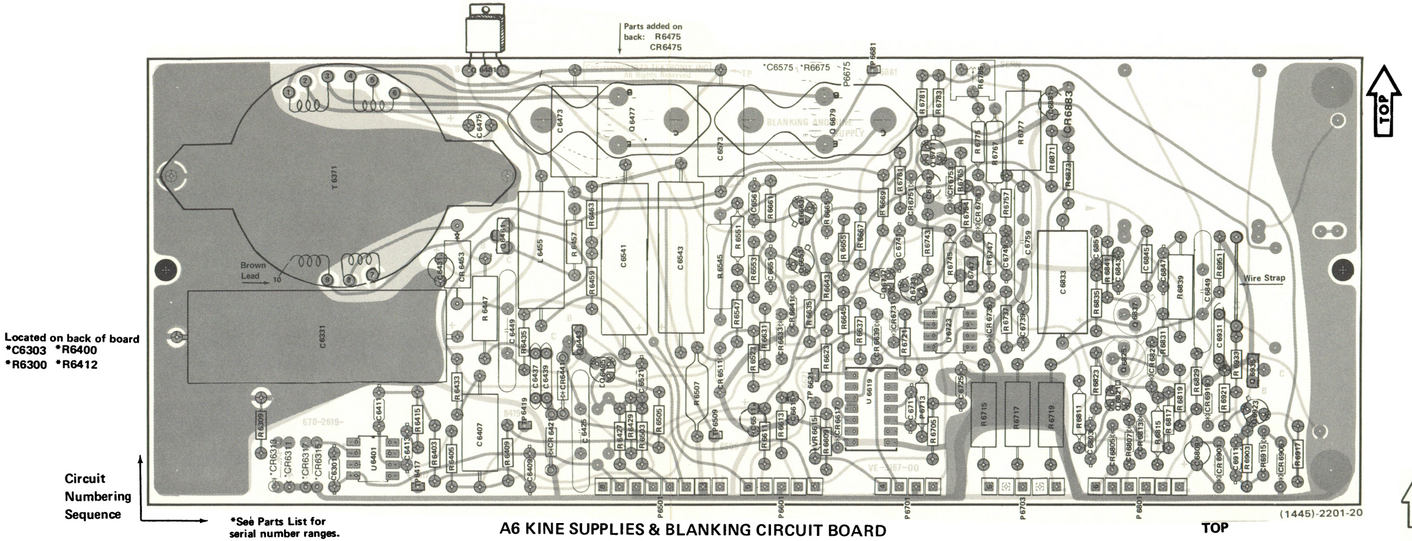


3 VERT DRIVE



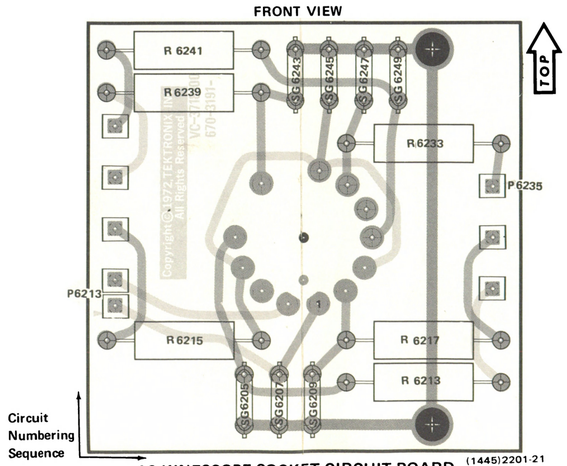
WAVEFORMS


PART OF A5 DEFLECTION BOARD
HORIZONTAL CONVERGENCE
VERTICAL CONVERGENCE
VERTICAL RATE HORIZONTAL CONVERGENCE
TOP & BOTTOM PINCUSHION
SCAN FAILURE DETECTOR
SCAN FAILURE DETECTOR
VERT RAMP INVERTER
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
VERT CONVERGENCE COIL L5900
½ HORIZ CONVERGENCE YOKE L5450
LOCATED ON BACK OF DEFLECTION YOKE
670A & 671A
(1445) 2201-40 REV A, FEB 1979
CONVERGENCE, PINCUSHION & SCAN FAILURE
13
6/73
GEM

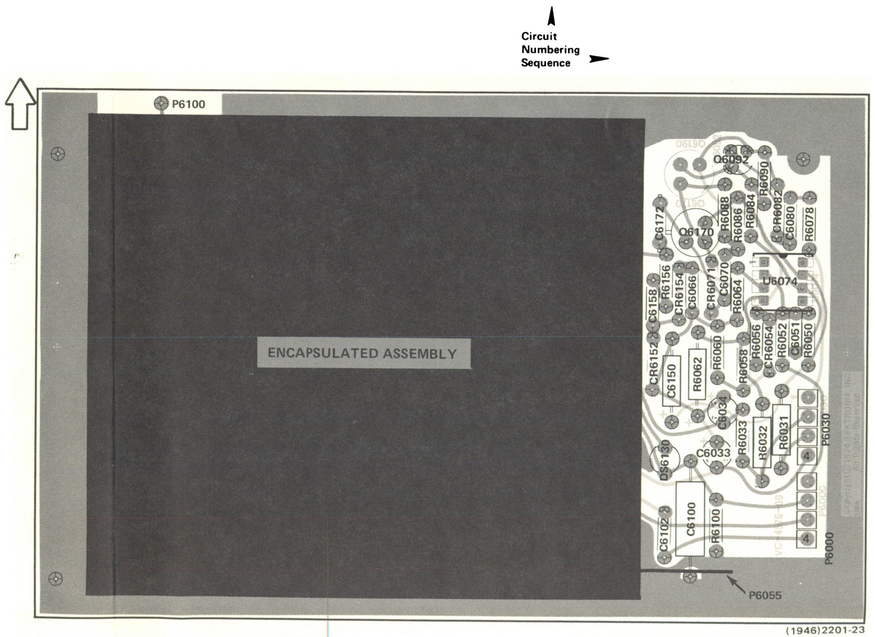


A6 KINE SUPPLIES & BLANKING CIRCUIT BOARD

TOP



A8 KINESCOPE SOCKET CIRCUIT BOARD



A7 EHT CIRCUIT BOARD

14

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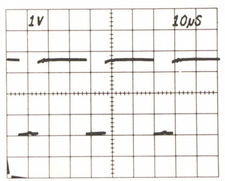
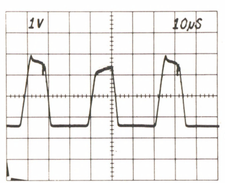
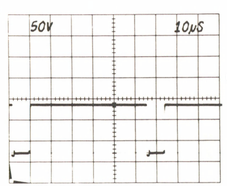


2



3



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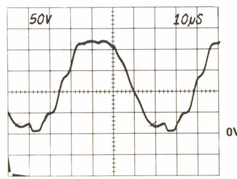
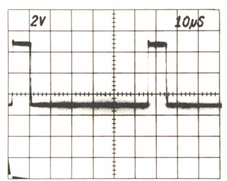
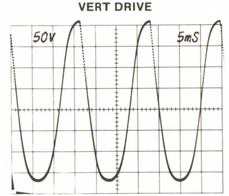


5



6

VERT DRIVE



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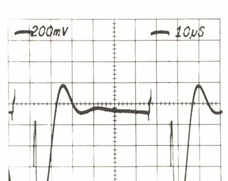
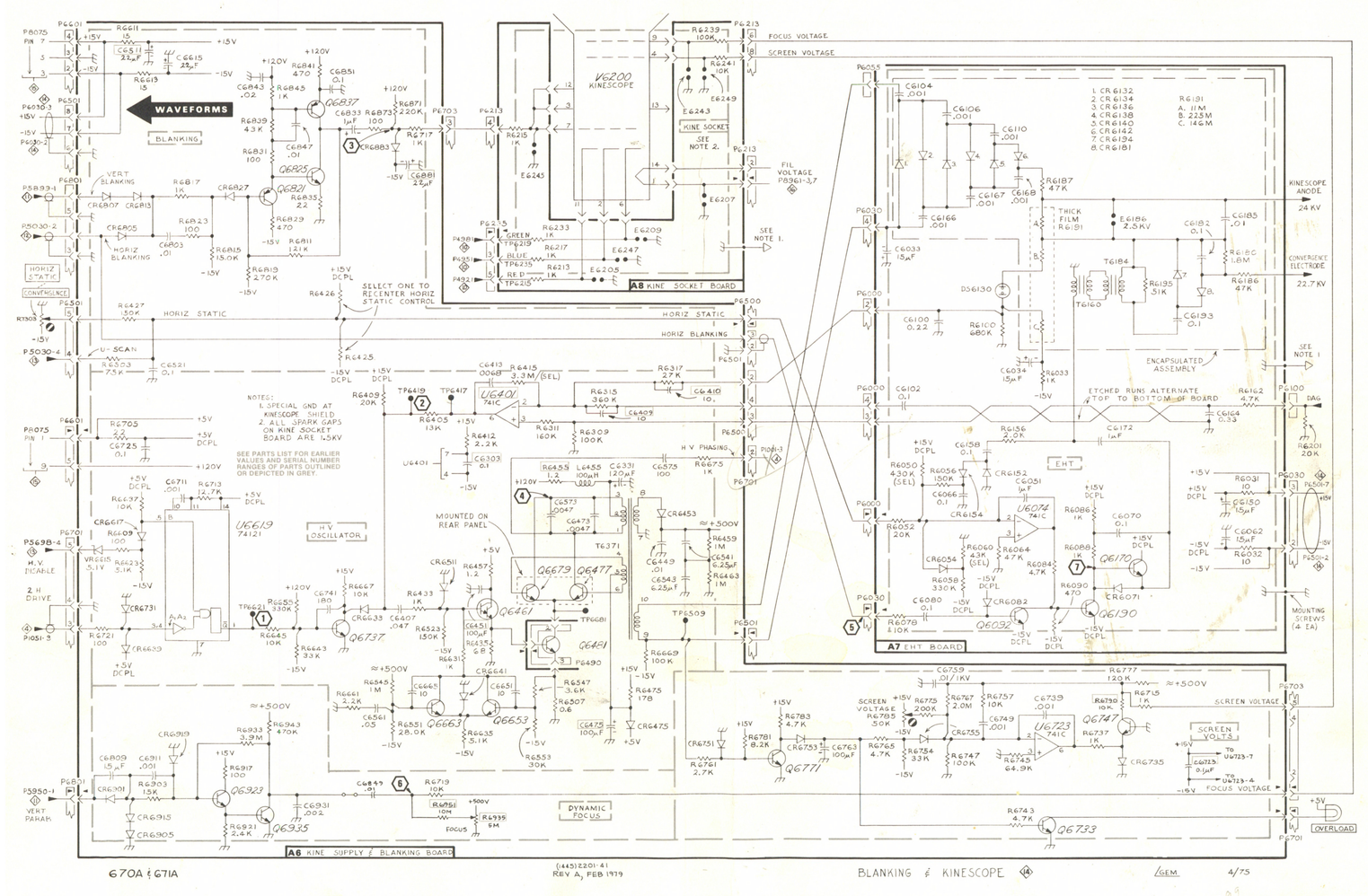
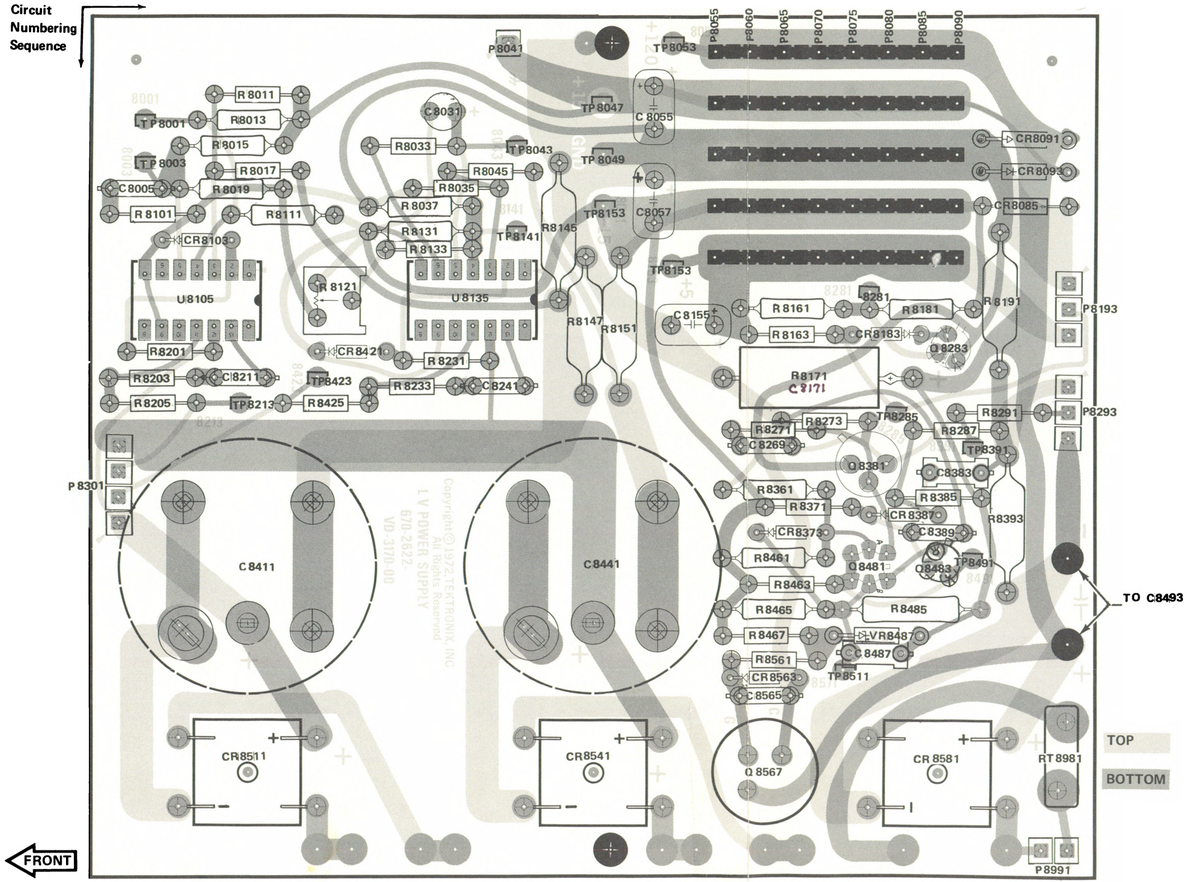
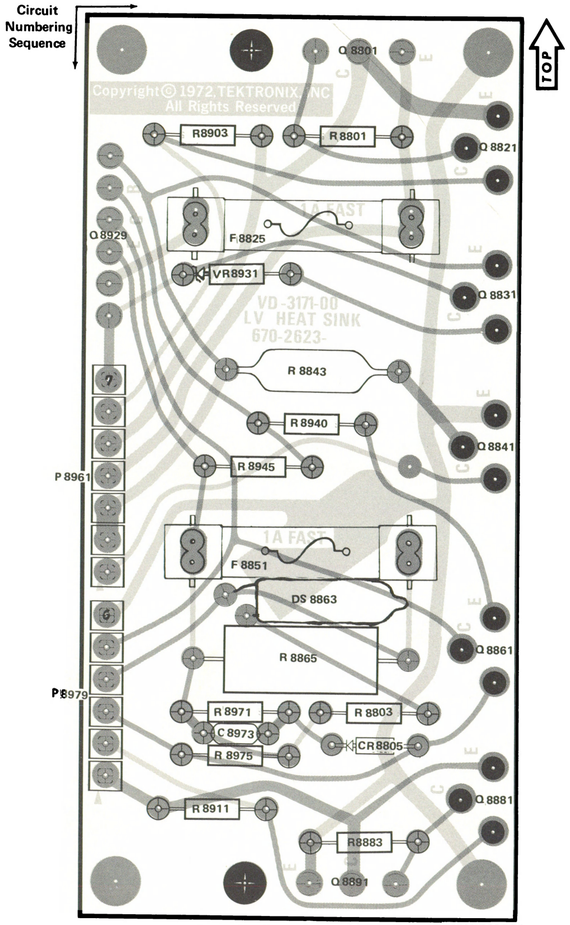


AC COUPLED

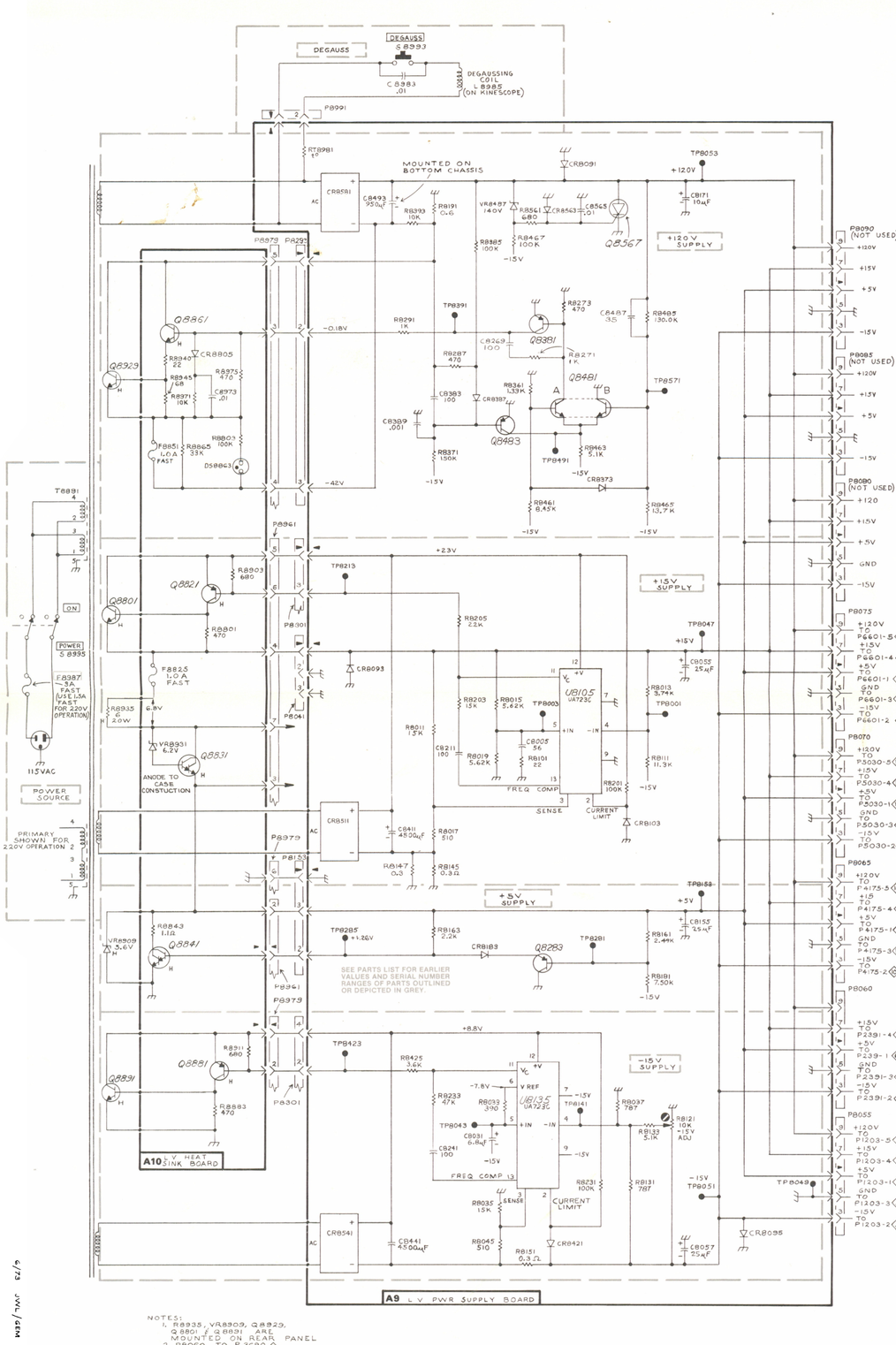




A9 LV POWER SUPPLY CIRCUIT BOARD



A10 LV HEAT SINK CIRCUIT BOARD (1946)2201-22



NOTES:
1. R8935, VR8909, Q8829, Q8801 & Q8831 ARE MOUNTED ON REAR PANEL
2. P8060 TO P3690 (4) IN 671A

670A & 671A

(1445) 7220-47 REV A, FEB 1974

LV POWER SUPPLY (15)

6/73 JWL/GEM

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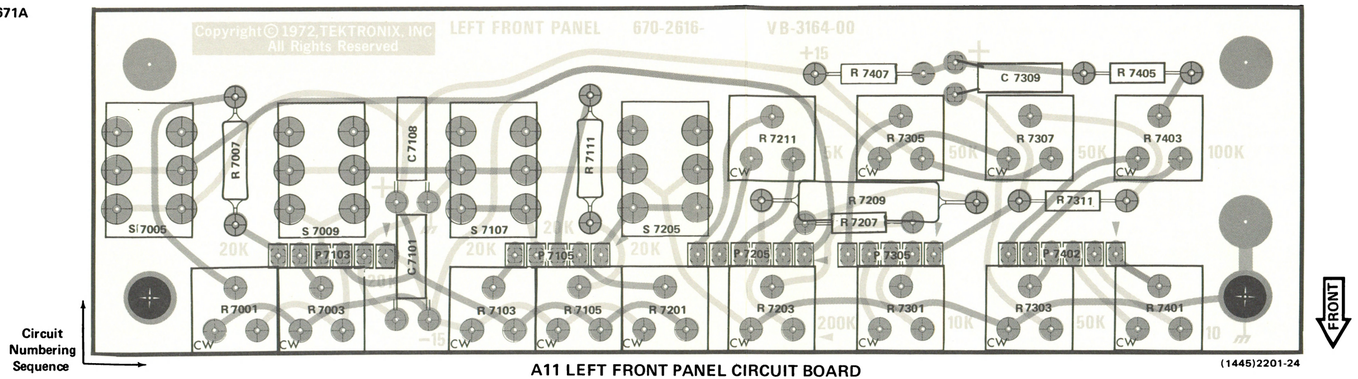
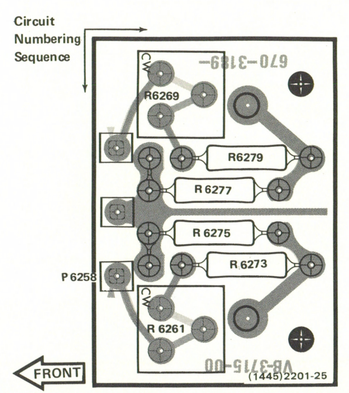
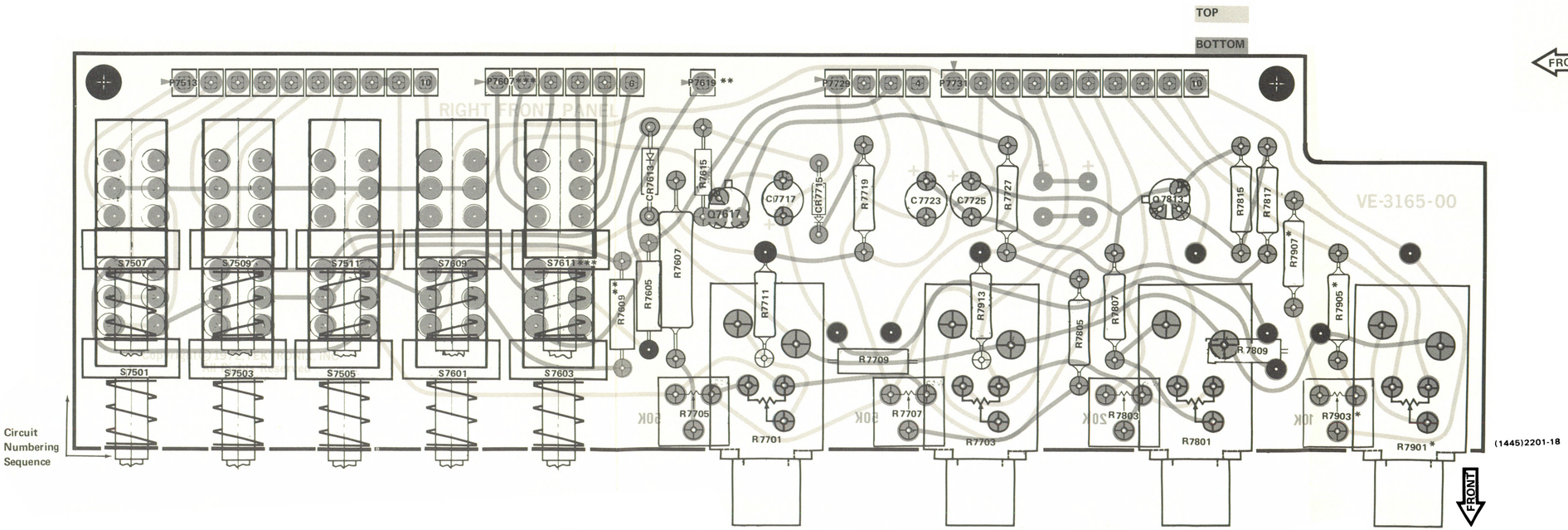


A11 LEFT FRONT PANEL CIRCUIT BOARD



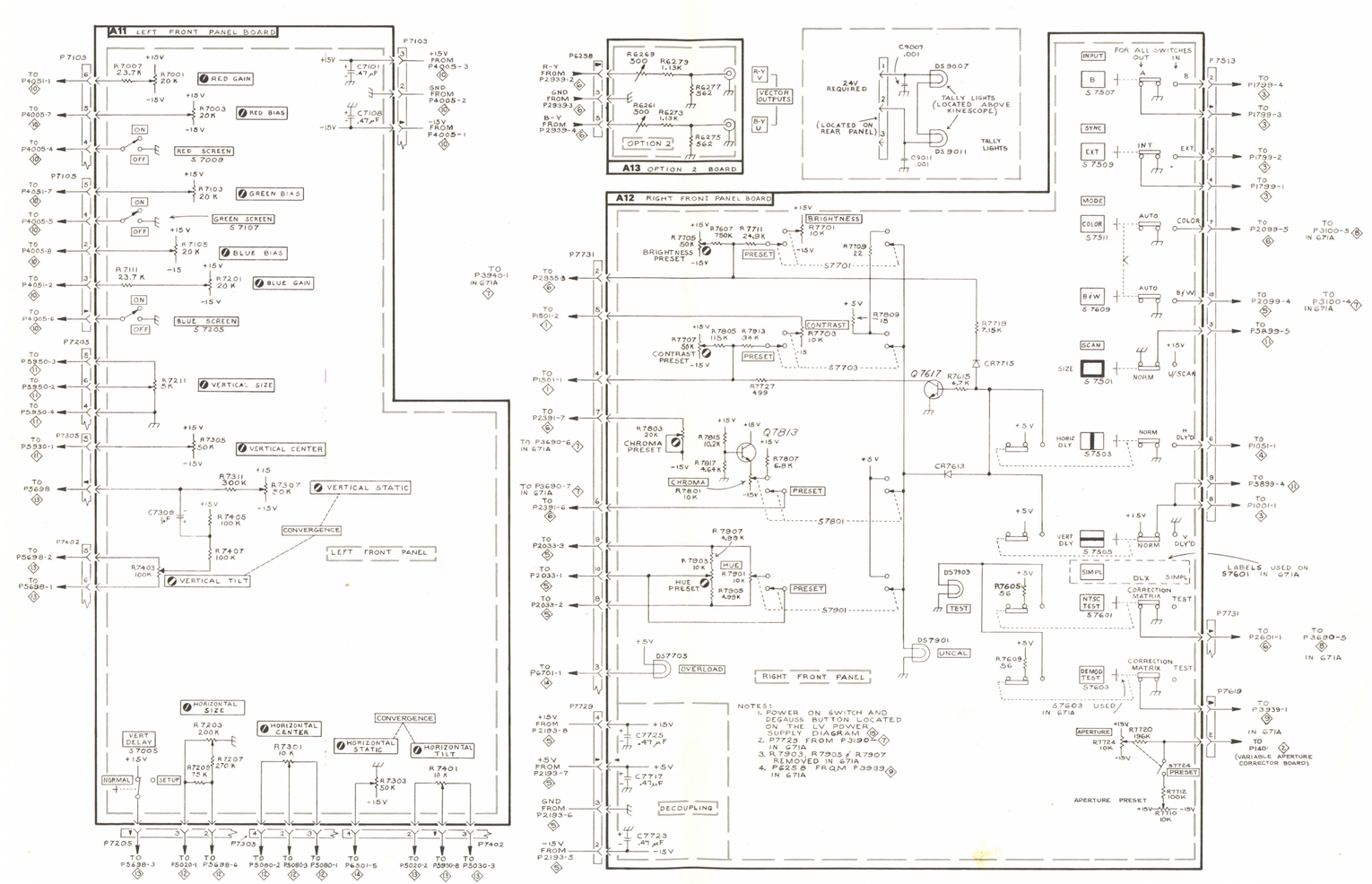
A13 OPTION 2 CIRCUIT BOARD



A12 RIGHT FRONT PANEL CIRCUIT BOARD

*Removed in 671A Monitor.
**Added in 671A Monitor.
***Not used.

@



670A & 671A

(445)2201-43
REV A, FEB 1979

FRONT PANEL CONTROLS f OPTION 2

16 6/73 GEM

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 *Name & Description*

Assembly and/or Component
Attaching parts for Assembly and/or Component
- - - * - - -
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
- - - * - - -
Parts of Detail Part
Attaching parts for Parts of Detail Part
- - - * - - -

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH
#	NUMBER SIZE
ACTR	ACTUATOR
ADPTR	ADAPTER
ALIGN	ALIGNMENT
AL	ALUMINUM
ASSEM	ASSEMBLED
ASSY	ASSEMBLY
ATTEN	ATTENUATOR
AWG	AMERICAN WIRE GAGE
BD	BOARD
BRKT	BRACKET
BRS	BRASS
BRZ	BRONZE
BSHG	BUSHING
CAB	CABINET
CAP	CAPACITOR
CER	CERAMIC
CHAS	CHASSIS
CKT	CIRCUIT
COMP	COMPOSITION
CONN	CONNECTOR
COV	COVER
CPLG	COUPLING
CRT	CATHODE RAY TUBE
DEG	DEGREE
DWR	DRAWER
ELCTRN	ELECTRON
ELEC	ELECTRICAL
ELCTLT	ELECTROLYTIC
ELEM	ELEMENT
EPL	ELECTRICAL PARTS LIST
EQPT	EQUIPMENT
EXT	EXTERNAL
FIL	FILLISTER HEAD
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FR	FRAME or FRONT
FSTNR	FASTENER
FT	FOOT
FXD	FIXED
GSKT	GASKET
HDL	HANDLE
HEX	HEXAGON
HEX HD	HEXAGONAL HEAD
HEX SOC	HEXAGONAL SOCKET
HLCPS	HELICAL COMPRESSION
HLEXT	HELICAL EXTENSION
HV	HIGH VOLTAGE
IC	INTEGRATED CIRCUIT
ID	INSIDE DIAMETER
IDENT	IDENTIFICATION
IMPLR	IMPELLER
IN	INCH
INCAND	INCANDESCENT
INSUL	INSULATOR
INTL	INTERNAL
LPHLDR	LAMPHOLDER
MACH	MACHINE
MECH	MECHANICAL
MTG	MOUNTING
NIP	NIPPLE
NON WIRE	NOT WIRE WOUND
OBD	ORDER BY DESCRIPTION
OD	OUTSIDE DIAMETER
OVH	OVAL HEAD
PH BRZ	PHOSPHOR BRONZE
PL	PLAIN or PLATE
PLSTC	PLASTIC
PN	PART NUMBER
PNH	PAN HEAD
PWR	POWER
RCPT	RECEPTACLE
RES	RESISTOR
RGD	RIGID
RLF	RELIEF
RTNR	RETAINER
SCH	SOCKET HEAD
SCOPE	OSCILLOSCOPE
SCR	SCREW
SE	SINGLE END
SECT	SECTION
SEMICOND	SEMICONDUCTOR
SHLD	SHIELD
SHLDR	SHOULDERED
SKT	SOCKET
SL	SLIDE
SLFLKG	SELF-LOCKING
SLVG	SLEEVING
SPR	SPRING
SQ	SQUARE
SST	STAINLESS STEEL
STL	STEEL
SW	SWITCH
T	TUBE
TERM	TERMINAL
THD	THREAD
THK	THICK
TNSN	TENSION
TPG	TAPPING
TRH	TRUSS HEAD
V	VOLTAGE
VAR	VARIABLE
W/	WITH
WSHR	WASHER
XFMR	TRANSFORMER
XSTR	TRANSISTOR

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

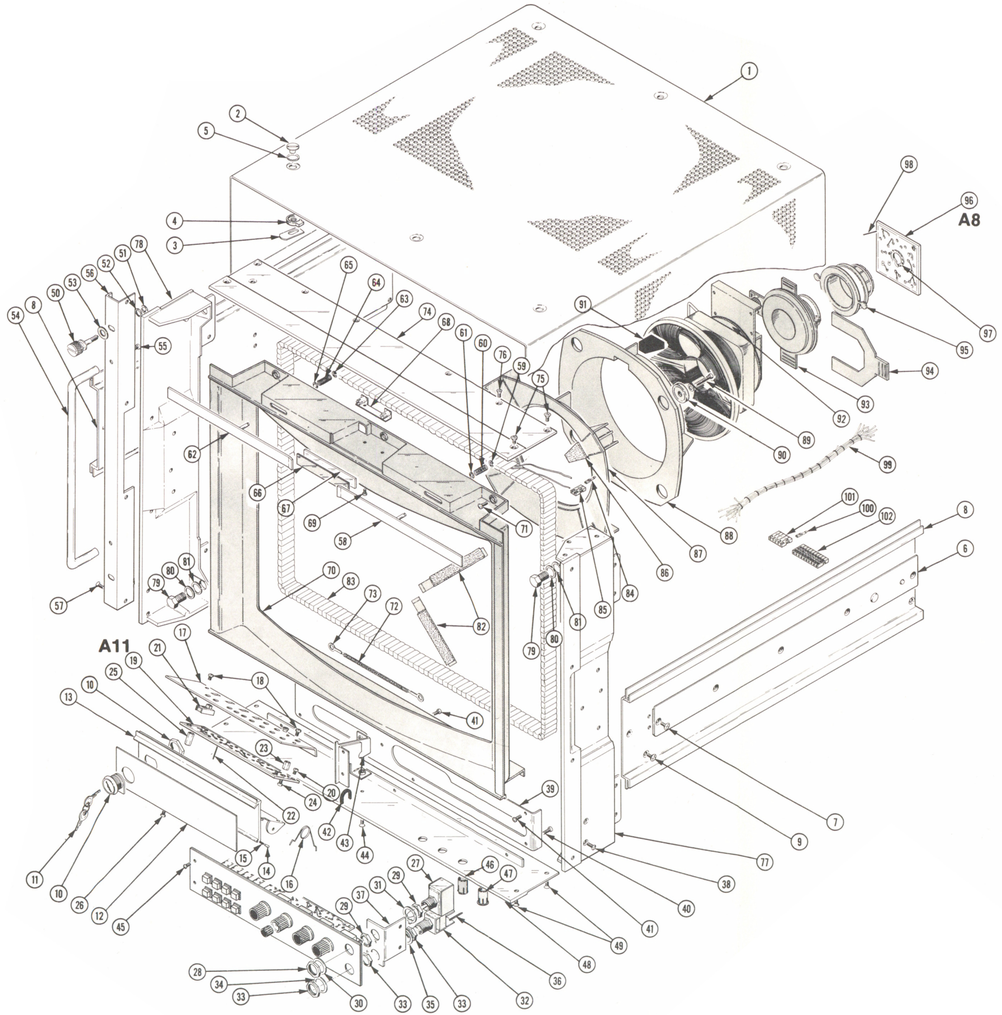
Mfr. Code	Manufacturer	Address	City, State, Zip
000AE	GARDNER SPRING COMPANY	1115 N UTICA	TULSA, OK 74110
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRUS DRIVE	BEAVERTON, OREGON 97005
0000G	J.L.O. METAL PRODUCTS	2001 N PARKSIDE	CHICAGO, IL 60639
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05820	WAKEFIELD ENGINEERING, INC.	AUDUBON ROAD	WAKEFIELD, MA 01880
09422	PLASTIC STAMPING CORPORATION	2216 W. ARMITAGE AVE.	CHICAGO, IL 60647
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
13103	THERMALLOY COMPANY, INC.	2021 W VALLEY VIEW LANE P O BOX 34829	DALLAS, TEXAS 75234
13511	AMPHENOL CARDRE DIV., BUNKER RAMO CORP.		LOS GATOS, CA 95030
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
26365	GRIES REPRODUCER CO., DIV. OF COATS AND CLARK, INC.	125 BEECHWOOD AVE.	NEW ROCHELLE, NY 10802
27193	CUTLER-HAMMER, INC. SPECIALTY PRODUCTS DIVISION	4201 N. 27TH ST.	MILWAUKEE, WI 53216
28520	HEYMAN MFG. CO.	147 N. MICHIGAN AVE.	KENILWORTH, NJ 07033
49671	RCA CORPORATION	30 ROCKEFELLER PLAZA	NEW YORK, NY 10020
52905	SIMPLEX MFG. COMPANY	5224 NE 42ND AVENUE	PORTLAND, OREGON 97218
55210	GETTIG ENG. AND MFG. COMPANY	PO BOX 85, OFF ROUTE 45	SPRING MILLS, PA 16875
63743	WARD LEONARD ELECTRIC CO., INC.	31 SOUTH ST.	MOUNT VERNON, NY 10550
71590	CENTRALAB ELECTRONICS, DIV. OF GLOBE-UNION, INC.	P O BOX 858	FORT DODGE, IA 50501
71785	TRW, CINCH CONNECTORS	1501 MORSE AVENUE	ELK GROVE VILLAGE, IL 60007
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
76381	MINNESOTA MINING AND MFG. CO.	3M CENTER	ST. PAUL, MN 55101
77132	DOT FASTENER CO., A UNITED-CARR DIV. OF TRW INC.	ROUND HOUSE INDL PK,PO BOX 710	WATERBURY, CT 06720
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
78584	STEWART STAMPING CORP.	630 CENTRAL PARK AVE.	YONKERS, NY 10704
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
79727	C-W INDUSTRIES	550 DAVISVILLE RD.,P O BOX 96	WARMINISTER, PA 18974
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
81741	CHICAGO LOCK CO.	4311 W. BELMONT AVE.	CHICAGO, IL 60641
82389	SWITCHCRAFT, INC.	5555 N. ELSTON AVE.	CHICAGO, IL 60630
82647	TEXAS INSTRUMENTS, INC., CONTROL PRODUCTS DIV.	34 FOREST ST.	ATTLEBORO, MA 02703
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
84830	LEE SPRING COMPANY, INC.	30 MAIN STREET	BROOKLYN, NY 11201
86445	PENN FIBRE AND SPECIALTY CO., INC.	2032 E. WESTMORELAND ST.	PHILADELPHIA, PA 19134
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
91260	CONNOR SPRING AND MFG. CO.	1729 JUNCTION AVE.	SAN JOSE, CA 95112
93410	ESSEX INTERNATIONAL, INC., CONTROLS DIV. LEXINGTON PLANT	P. O. BOX 1007	MANSFIELD, OH 44903
95760	PROTECTIVE CLOSURES COMPANY, INC.	2150 ELMWOOD AVENUE	BUFFALO, NY 14207
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641
97913	INDUSTRIAL ELECTRONIC HARDWARE CORP.	109 PRINCE STREET	NEW YORK, NY 10012
99017	PROTECTIVE CLOSURES COMPANY, INC., CAPLUGS DIVISION	2150 ELMWOOD AVENUE	BUFFALO, NY 14207

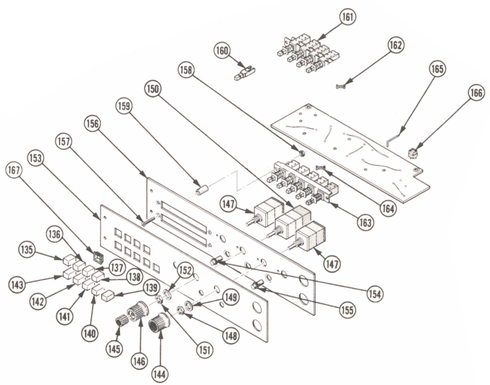
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-1	390-0361-00			2		CABINET,SCOPE:TOP AND BOTTOM	80009	390-0361-00
						(ATTACHING PARTS FOR EACH)		
-2	214-0603-01			6		PIN,SECURING:0.27 INCH LONG	80009	214-0603-01
-3	386-0226-00			6		CLAMP,RIM CLENC:SPG STL CD PL	80009	386-0226-00
-4	386-0227-01			6		STOP,CLP,RIM CL:BLACK ACETAL	80009	386-0227-01
-5	214-0604-00			6		WASH.,SPG TNSN:0.26 ID X 0.47 INCH OD	80009	214-0604-00
						- - - * - - -		
-6	351-0377-00			1		SLIDE,GUIDE:	80009	351-0377-00
						(ATTACHING PARTS)		
-7	212-0506-00			8		SCREW,MACHINE:10-32 X 0.375 INCH,FLH STL	83385	OBD
						- - - * - - -		
-8	426-1018-00			2		FRAME SECTION:RACKMOUNT SLIDE MOUNTING	80009	426-1018-00
						(ATTACHING PARTS FOR EACH)		
-9	212-0040-00			6		SCREW,MACHINE:8-32 X 0.375 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-10	105-0270-00			1		LOCK,RIM:KEY ACTUATED	81741	3174-CL
-11	214-1814-00			1		. KEY,LOCK,SET:H1636	80009	214-1814-00
-12	333-2208-00			1		PANEL,FRONT:LEFT ACCESS DOOR	80009	333-2208-00
	333-2235-00			1		PANEL,FRONT:LEFT,ACCESS DOOR	80009	333-2235-00
-13	200-1845-00			1		DOOR,ACCESS:WITH CHASSIS	80009	200-1845-00
						(ATTACHING PARTS)		
-14	214-1029-00			2		PIN,SHLD,HDLS:0.31 INCH LONG	80009	214-1029-00
-15	214-1028-00			2		SPRING,HLCPS:0.380 INCH LONG	91260	OBD
-16	214-1976-00			1		SPR,HLCL,TRSN:	80009	214-1976-00
						- - - * - - -		
-17	333-1719-00			1		PANEL,FRONT:LEFT 670A	80009	333-1719-00
						(ATTACHING PARTS)		
-18	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-19	----- -----			1		CKT BOARD ASSY:LEFT FRONT PANEL(SEE A11 EPL)		
						(ATTACHING PARTS)		
-20	211-0008-00			4		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-21	260-0723-00			4		. SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
-22	131-0608-00			31		. TERMINAL,PIN:0.365 L X 0.25 PH,BRZ,GOLD PL	22526	47357
-23	361-0041-00			1		POST,ELEC-MECH:4-40 X 0.25 X0.375 INCH L	80009	361-0041-00
						(ATTACHING PARTS)		
-24	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-25	129-0419-00			1		POST,ELEC-MECH:HEX.,0.588 INCH LONG	80009	129-0419-00
						(ATTACHING PARTS)		
-26	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-27	260-1060-01			1		SWITCH,TOGGLE:DPST,15A,125VAC	27193	8906K-2507
						(ATTACHING PARTS)		
-28	210-0473-00			1		NUT,PLAIN,DODEC:0.469-32 X 0.638 INCH,BRS	80009	210-0473-00
-29	210-0414-00			2		NUT,PLAIN,HEX.:0.468-32 X 0.562 INCH,BRS	73743	3167-402
-30	210-0902-00			1		WASHER,FLAT:0.470 ID X 0.656 INCH OD,STL	12327	OBD
-31	354-0055-00			1		WASHER,KEY:0.469 ID X 0.688 INCH OD,STL	80009	354-0055-00
						- - - * - - -		
-32	260-0574-01			1		SWITCH,PUSH:SPDT,10A,250VAC	80009	260-0574-01
						(ATTACHING PARTS)		
-33	210-0414-00			1		NUT,PLAIN,HEX.:0.468-32 X 0.562 INCH,BRS	73743	3167-402
-34	210-0902-00			1		WASHER,FLAT:0.470 ID X 0.656 INCH OD,STL	12327	OBD
-35	354-0055-00			1		WASHER,KEY:0.469 ID X 0.688 INCH OD,STL	80009	354-0055-00
						- - - * - - -		
-36	131-0787-00			4		CONTACT,ELEC:0.64 INCH LONG	22526	47359
-37	407-1027-00			1		BRACKET,ANGLE:	80009	407-1027-00
						(ATTACHING PARTS)		
-38	211-0541-00			2		SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-39	386-2651-01			1		SPRT,CRT BEZEL:	80009	386-2651-01
						(ATTACHING PARTS)		
-40	211-0507-00			3		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-41	211-0565-00			1		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
						- - - * - - -		
-42	348-0115-00			1		GROMMET,PLASTIC:U-SHP,0.548 X0.462 INCH	80009	348-0115-00
-43	407-1277-01			1		BRACKET,SPRT:RIGHT FRONT PANEL,W/SPACER	80009	407-1277-01
						(ATTACHING PARTS)		
-44	211-0583-00			1		SCREW,MACHINE:0.25-32 X 0.312 INCH,BRS	83385	OBD
-45	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-46	134-0151-00			3		BUTTON,PLUG:0.25 MTG HOLEDIA,NYLON	28520	P250
-47	352-0157-01			4		LAMPHOLDER:BLACK PLASTIC	80009	352-0157-01
-48	426-1252-01			1		FRAME SECT,CAB.:FRONT BOTTOM	80009	426-1252-01
						(ATTACHING PARTS)		
-49	212-0040-00			7		SCREW,MACHINE:8-32 X 0.375 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-50	213-0167-00			4		THUMBSCREW:10-32 X 1.344 INCH LONG	80009	213-0167-00
						(ATTACHING PARTS FOR EACH)		
-51	354-0175-00			1		RING,RETAINING:TYPE EXT,U/O 0.188 ID SFT	79136	5133-18-MI
-52	210-0805-00			1		WASHER,FLAT:0.204 ID X 0.438 INCH OD,STL	12327	OBD
-53	210-0917-00			1		WASHER,NONMETAL:0.191 ID X 0.625 INCH OD	86445	OBD
						- - - * - - -		
-54	367-0149-00			2		HANDLE,BOW:0.375 INCH DIA,NKL-CRM PLATED	80009	367-0149-00
						(ATTACHING PARTS FOR EACH)		
-55	212-0507-00			2		SCREW,MACHINE:10-32 X 0.375 INCH,PNH STL	83385	OBD
						- - - * - - -		
-56	426-1021-00			2		FRAME SECTION:RACKMOUNT,RIGHT AND LEFT	80009	426-1021-00
						(ATTACHING PARTS FOR EACH)		
-57	211-0538-00			4		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-58	334-2143-00			1		PLATE,IDENT:RIGHT 670A	80009	334-2143-00
	334-2183-00			1		PLATE,IDENT:RIGHT 671A	80009	334-2183-00
						(ATTACHING PARTS)		
-59	354-0163-00			1		RING,RETAINING:TRUARC,CAD PLATE	79136	5133-12MD
-60	214-1338-00			1		SPRING,HLCPS:0.875 INCH LONG	84830	LC-016B-10-SS
-61	210-0894-00			1		WASHER,NONMETAL:0.19 ID X 0.438" OD,PLSTC	09422	OBD
						- - - * - - -		
-62	334-2144-01			1		PLATE,IDENT:LEFT 670A		
						(ATTACHING PARTS)		
-63	354-0163-00			1		RING,RETAINING:TRUARC,CAD PLATE	79136	5133-12MD
-64	214-1338-00			1		SPRING,HLCPS:0.875 INCH LONG	84830	LC-016B-10-SS
-65	210-0894-00			1		WASHER,NONMETAL:0.19 ID X 0.438" OD,PLSTC	09422	OBD
						- - - * - - -		
-66	331-0290-00			1		WINDOW,LAMP:CLEAR PLASTIC	80009	331-0290-00
-67	378-0697-01			1		LENS,LIGHT:3.0 X 0.53,WHITE	80009	378-0697-01
	331-0290-00			1		WINDOW,LAMP:CLEAR PLASTIC	80009	331-0290-00
-68	136-0456-00			1		LAMP HOLDER ASSY:	80009	136-0456-00
						(ATTACHING PARTS)		
-69	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-70	200-1565-02			1		BEZEL,MONITOR:17.0 IN	80009	200-1565-02
						(ATTACHING PARTS)		
-71	211-0504-00			2		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-72	214-1699-00			1		SPRING,HLEXT:0.188 OD X 4.0" LONG	000AE	V14C
-73	210-0269-00			2		TERMINAL,LUG:NON LOCKING,0.257" MTG HOLE	78584	OBD
-74	426-1015-00			1		FRAME SECTION:TOP FRONT	80009	426-1015-00
						(ATTACHING PARTS)		
-75	212-0040-00			6		SCREW,MACHINE:8-32 X 0.375 100 DEG,FLH STL	83385	OBD
-76	211-0538-00			4		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-77	426-1019-01			1		FRAME SECTION:RIGHT	80009	426-1019-01
-78	426-1019-02			1		FRAME SECTION:LEFT	80009	426-1019-02

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-79	213-0452-00			4		SCREW,MACHINE:0.312-18 X 0.875 HEX,STL	83385	OBD
-80	210-0802-00			4		WASHER,FLAT:0.15 ID X 0.312 INCH OD	12327	OBD
-81	210-0057-00			4		WASHER,LOCK:SPLIT,0.325 ID	83385	OBD
-82	124-0300-00			4		STRIP,TUNING:CONVERGENCE	80009	124-0300-00
-83	----- -----			1		COIL,DEGAUSSING:(SEE L8985 EPL)		
-84	131-0621-00			2		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-85	352-0198-00			1		. HLDR,TERM CONN:2 WIRE BLACK	80009	352-0198-00
-86	253-0188-00			FT		TAPE,PRESS SENS:0.125 INCH THICK AS/REQ	76381	#4008
-87	386-3019-00			1		SPRT,CRT YOKE:FRONT	80009	386-3019-00
-88	386-3020-00			1		SPRT,CRT YOKE:REAR	80009	386-3020-00
						(ATTACHING PARTS)		
-89	213-0337-00			4		SCREW,MACHINE:18MM WITH WASHER	80009	213-0337-00
-90	210-1176-00			4		WASHER,FLAT:CRT YOKE		
						- - - * - - -		
-91	348-0381-00			1		PAD,CUSHIONING:WEDGE	80009	348-0381-00
-92	119-0591-01			1		COIL,ASSY:DEFLECTION YOKE	80009	119-0591-01
-93	352-0383-00			1		HOLDER,MAGNET:	80009	352-0383-00
-94	119-0584-00			2		MAGNET,PERM:CONVERGANCE	80009	119-0584-00
-95	119-0590-01			1		COIL,ASSY:VERTICAL CONVERGANCE	80009	119-0590-01
-96	----- -----			1		CKT BOARD ASSY:KINE SOCKET(SEE A8 EPL)		
-97	136-0234-00			12		. SOCKET,PIN TERM:0.088 OD X 0.247 INCH L	00779	380598-1
-98	131-0787-00			7		. CONTACT,ELEC:0.64 INCH LONG	22526	47359
-99	179-2100-00			1		WIRING HARNESS:YOKE	80009	179-2100-00
-100	131-0621-00			18		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-101	352-0201-00			1		. CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0201-00
-102	352-0206-00			1		. HLDR,TERM CONN:10 WIRE BLACK	80009	352-0206-00
	644-0049-04			1		PANEL ASSY:FRONT RIGHT,670A	80009	644-0049-04
-103	366-1489-47			1		. PUSH BUTTON:B	80009	366-1489-47
-104	366-1489-43			1		. PUSH BUTTON:EXT	80009	366-1489-43
-105	366-1489-46			1		. PUSH BUTTON:COLOR	80009	366-1489-46
-106	366-1489-45			1		. PUSH BUTTON:B&W	80009	366-1489-45
-107	366-1489-52			1		. PUSH BUTTON:NTSC TEST	80009	366-1489-52
-108	366-1489-51			1		. PUSH BUTTON:VERT BAR	80009	366-1489-51
-109	366-1489-50			1		. PUSH BUTTON:HORIZ BAR	80009	366-1489-50
-110	366-1489-44			1		. PUSH BUTTON:SQUARE	80009	366-1489-44
-111	426-0681-01			8		. FRAME,PUSH BTN:	80009	426-0681-01
-112	366-0497-00			3		. KNOB:GRAY	80009	366-0497-00
	213-0153-00			1		. . SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-113	366-1711-01			1		. KNOB:GRAY,0.082 ID,0.392 OD, 0.466 H	80009	366-1711-01
	213-0153-00			1		. . SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-114	366-1101-00			1		. KNOB:GRAY	80009	366-1101-00
	213-0153-00			1		. . SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-115	----- -----			3		. RES.,VAR:(SEE R7701,R7801,R7901 EPL)		
						(ATTACHING PARTS FOR EACH)		
-116	210-0583-00			1		. NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-117	210-0940-00			1		. WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
						- - - * - - -		
-118	----- -----			1		. RESISTOR,VAR:(SEE R7703 EPL)		
						(ATTACHING PARTS)		
-119	210-0583-00			1		. NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-120	210-0940-00			1		. WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
						- - - * - - -		
-121	333-1730-01			1		. PANEL,FRONT:RIGHT	80009	333-1730-01
-122	----- -----			1		. LAMP,CARTRIDGE:(SEE DS7901 EPL)		
-123	----- -----			1		. LAMP,CARTRIDGE:(SEE DS7705 EPL)		
-124	386-2543-00			1		. SUBPANEL,FRONT:RIGHT	80009	386-2543-00
						(ATTACHING PARTS)		
-125	211-0106-00			2		. SCREW,MACHINE:4-40 X 0.625"100 DEG,FLH,STL	83385	OBD
-126	210-0586-00			2		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
-127	361-0577-00			2		. SPACER,SLEEVE:0.188 OD X 0.465 INCH LONG	80009	361-0577-00
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-128	384-1136-00			4		. EXTENSION SHAFT:0.95 INCH LONG	80009	384-1136-00
-129	260-1574-00			1		. SWITCH,PUSH:4 SECTION	80009	260-1574-00
-130	361-0384-00			4		. SPACER,PB SW:0.133 INCH LONG	80009	361-0384-00
-131	260-1575-00			1		. SWITCH,PUSH:4 SECTION	80009	260-1575-00
-132	361-0542-00			4		. SPACER,SWITCH:PLASTIC	71590	J-64281
-133	131-0787-00			26		. CONTACT,ELEC:0.64 INCH LONG	22526	47359
-134	136-0220-00			2		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
	644-0051-01			1		PANEL ASSY,R FR:	80009	644-0051-01
-135	366-1489-47			1		. PUSH BUTTON:B	80009	366-1489-47
-136	366-1489-43			1		. PUSH BUTTON:EXT	80009	366-1489-43
-137	366-1489-46			1		. PUSH BUTTON:COLOR	80009	366-1489-46
-138	366-1489-45			1		. PUSH BUTTON:B&W	80009	366-1489-45
-139	366-1489-88			1		. PUSH BUTTON:DEMOD TEST	80009	366-1489-88
-140	366-1489-53			1		. PUSH BUTTON:SMPL	80009	366-1489-53
-141	366-1489-51			1		. PUSH BUTTON:VERT BAR	80009	366-1489-51
-142	366-1489-50			1		. PUSH BUTTON:HORIZ BAR	80009	366-1489-50
-143	366-1489-44			1		. PUSH BUTTON:SQUARE	80009	366-1489-44
-144	366-0497-00			2		. KNOB:GRAY	80009	366-0497-00
	213-0153-00			1		. . SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-145	366-1711-01			1		. KNOB:GRAY,0.082 ID,0.392 OD, 0.466 H	80009	366-1711-01
	213-0153-00			1		. . SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-146	366-1101-00			1		. KNOB:GRAY	80009	366-1101-00
	213-0153-00			1		. . SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-147	----- -----			2		. RES.,VAR:(SEE R7701,R7801 EPL)		
						(ATTACHING PARTS FOR EACH)		
-148	210-0583-00			1		. NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-149	210-0940-00			1		. WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
						- - - * - - -		
-150	----- -----			1		. RES.,VAR:(SEE R7703 EPL)		
						(ATTACHING PARTS)		
-151	210-0583-00			1		. NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-152	210-0940-00			1		. WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
						- - - * - - -		
-153	333-1819-01			1		. PANEL,FRONT:RIGHT	80009	333-1819-01
-154	----- -----			1		. LAMP,CARTRIDGE:(SEE DS7705 EPL)		
-155	----- -----			1		. LAMP,CARTRIDGE:(SEE DS7901 EPL)		
-156	386-2543-00			1		. SUBPANEL,FRONT:RIGHT	80009	386-2543-00
						(ATTACHING PARTS)		
-157	211-0106-00			2		. SCREW,MACHINE:4-40 X 0.625"100 DEG,FLH,STL	83385	OBD
-158	210-0586-00			2		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
-159	361-0577-00			2		. SPACER,SLEEVE:0.188 OD X 0.465 INCH LONG	80009	361-0577-00
						- - - * - - -		
-160	384-1136-00			4		. EXTENSION SHAFT:0.95 INCH LONG	80009	384-1136-00
-161	260-1574-00			1		. SWITCH,PUSH:4 SECTION	80009	260-1574-00
-162	361-0384-00			4		. SPACER,PB SW:0.133 INCH LONG	80009	361-0384-00
-163	260-1617-00			1		. SWITCH,PUSH:5 SECTION	80009	260-1617-00
-164	361-0542-00			4		. SPACER,SWITCH:PLASTIC	71590	J-64281
-165	131-0787-00			25		. CONTACT,ELEC:0.64 INCH LONG	22526	47359
-166	136-0220-00			2		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
-167	426-0681-01			9		. FRAME,PUSH BTN:	80009	426-0681-01


A11
A8



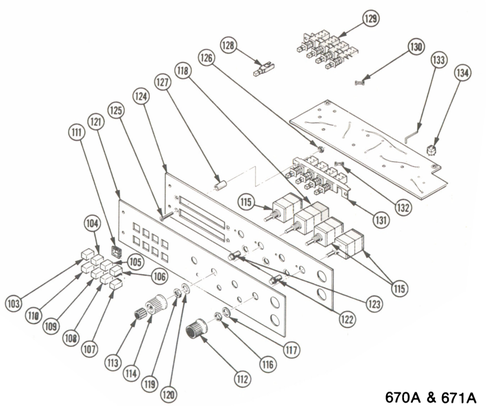
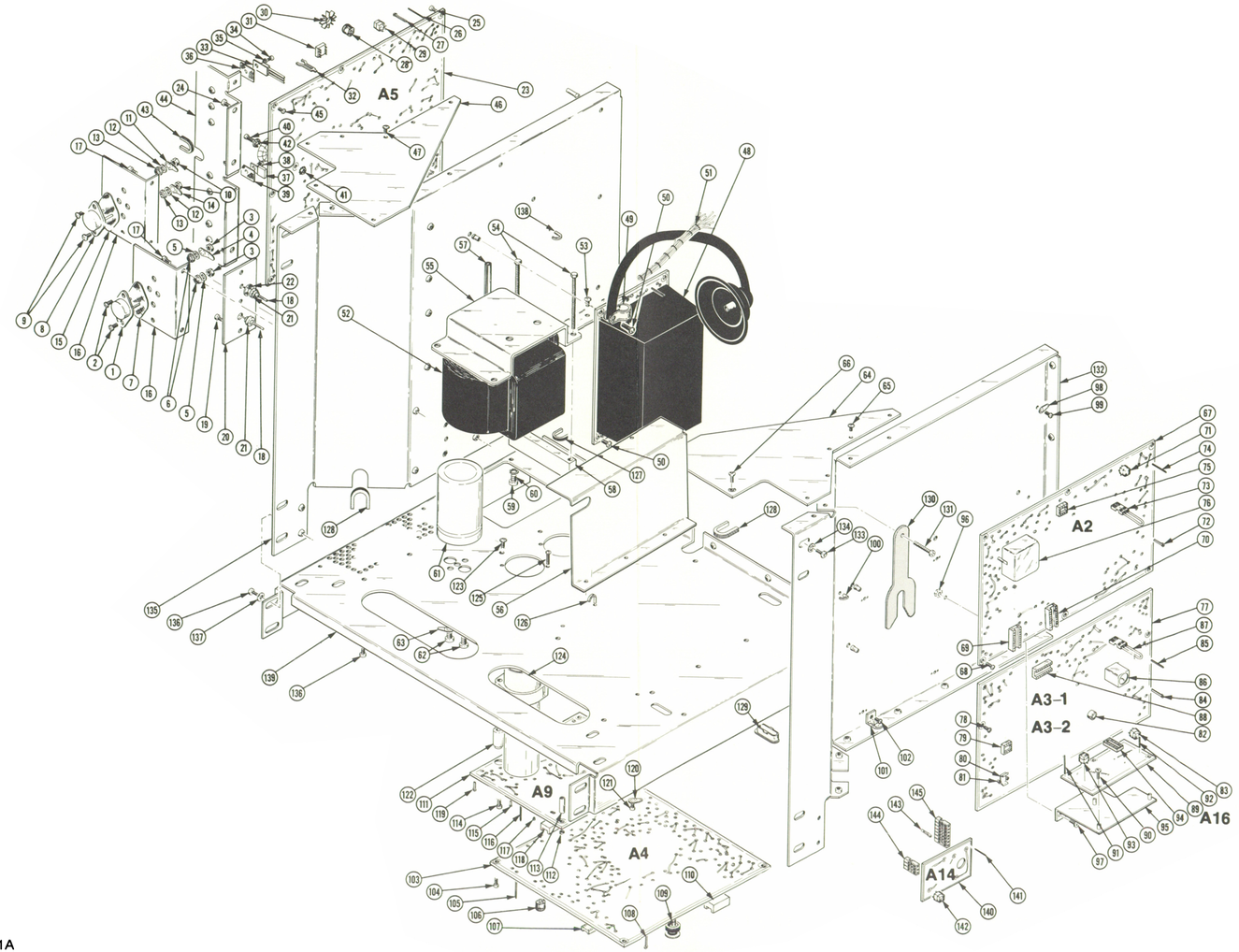


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-1	----- -----			1		TRANSISTOR:(SEE Q5030 EPL)		
						(ATTACHING PARTS)		
-2	211-0511-00			2		SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
-3	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-4	210-0202-00			1		TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
-5	210-0803-00			2		WASHER,FLAT:0.15 ID X 0.032 THK,STL CD PL	12327	OBD
-6	210-0967-00			2		WSHR,SHOULDERED:0.157 ID X 0.375 INCH OD	80009	210-0967-00
-7	386-0978-00			2		INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0978-00
						- - - * - - -		
-8	----- -----			1		TRANSISTOR:(SEE Q5000 EPL)		
						(ATTACHING PARTS)		
-9	211-0511-00			2		SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
-10	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-11	210-0202-00			1		TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
-12	210-0803-00			2		WASHER,FLAT:0.15 ID X 0.032 THK,STL CD PL	12327	OBD
-13	210-0967-00			2		WSHR,SHOULDERED:0.157 ID X 0.375 INCH OD	80009	210-0967-00
-14	210-0269-00			1		TERMINAL,LUG:NON LOCKING,0.257" MTG HOLE	78584	OBD
-15	386-0978-00			1		INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0978-00
						- - - * - - -		
-16	407-1280-00			2		BRKT,HEATSINK:DEFLECTION OUTPUT	80009	407-1280-00
						(ATTACHING PARTS FOR EACH)		
-17	211-0565-00			2		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
						- - - * - - -		
-18	----- -----			2		DIODE:(SEE CR5020 CR5021 EPL)		
						(ATTACHING PARTS)		
-19	211-0565-00			2		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-20	200-1627-00			1		COVER,HEATSINK:	80009	200-1627-00
-21	358-0042-00			2		BUSHING,SLEEVE:0.251D X 0.3150D X 0.187" L	80009	358-0042-00
-22	210-0921-00			1		WASHER,MICA:0.50 X 0.141 X0.005 INCH THK	80009	210-0921-00
						- - - * - - -		
-23	----- -----			1		CKT BOARD ASSY:DEFLECTION(SEE A5 EPL)		
						(ATTACHING PARTS)		
-24	211-0565-00			4		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-25	211-0008-00			5		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-26	131-0589-00			55		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-27	214-0579-00			15		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
-28	136-0183-00			7		. SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
-29	136-0220-00			42		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
-30	214-1292-00			1		. HEAT SINK,ELEC:TRANSISTOR	05820	205-AB
-31	136-0514-00			13		. SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	82647	C93-08-18
-32	344-0154-00			2		. CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
-33	----- -----			7		. TRANSISTOR:(SEE Q5000,Q5100,Q5200,Q5400,		
	----- -----			-		. Q5700,Q5800,Q5900 EPL)		
						(ATTACHING PARTS FOR EACH)		
-34	211-0214-00			1		. SCREW,MACHINE:4-40 X 0.25 INCH,TRH STL	83385	OBD
-35	210-1171-00	B010100	B030664	7		. WSHR,SHOULDERED:0.116 ID X 0.138 INCH OD	52905	A7148516P2
	210-1178-00	B030665		1		. WSHR,SHOULDERED:FOR MTG TO-220 TRANSISTOR	49671	DF 137A
-36	342-0163-00			1		. INSULATOR,PLATE:XSTR,0.675 X 0.625 X 0.001"	80009	342-0163-00
						- - - * - - -		
-37	----- -----			1		. TRANSISTOR:(SEE Q5300 EPL)		
						(ATTACHING PARTS)		
-38	211-0040-00			1		. SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC	26365	OBD
-39	342-0163-00			1		. INSULATOR,PLATE:XSTR,0.675 X 0.625 X 0.001"	80009	342-0163-00
						- - - * - - -		
-40	211-0513-00			1		. SCREW,MACHINE:6-32 X 0.625 INCH,PNH STL	83385	OBD
-41	210-0457-00			1		. NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-42	210-0967-00			1		. WSHR,SHOULDERED:0.157 ID X 0.375 INCH OD	80009	210-0967-00
-43	348-0115-00			1		. GROMMET,PLASTIC:U-SHP,0.548 X0.462 INCH	80009	348-0115-00
-44	407-1278-00			1		. BRKT,HEATSINK:DEFLECTION	80009	407-1278-00
						(ATTACHING PARTS)		
-45	211-0008-00			3		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-46	386-2650-00			1		STIFFNER,CHAS:LEFT	80009	386-2650-00
						(ATTACHING PARTS)		
-47	211-0565-00			5		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
						- - - * - - -		
-48	119-0724-00			1		POWER SUPPLY:EHT	80009	119-0724-00
						(ATTACHING PARTS)		
-49	343-0004-00			1		CLAMP,LOOP:0.312 INCH DIAMETER,PLSTC	95987	5-16-6B
-50	211-0565-00			4		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
						- - - * - - -		
-51	179-2363-00	B010100	B029999	1		WIRING HARNESS:EHT FEEDBACK	80009	179-2363-00
	175-2053-00	B030000		1		CA ASSY,SP,ELEC:4,26 AWG,7.25L	80009	175-2053-00
-52	----- -----			1		TRANSFORMER:(SEE T8891 EPL)		
						(ATTACHING PARTS)		
-53	211-0540-00			2		SCREW,MACHINE:6-32 X 0.50 INCH,TRH STL	83385	OBD
-54	212-0522-00			4		SCREW,MACHINE:10-32 X 2.50",HEX HD STL	83385	OBD
-55	407-1357-00			1		BRACKET,XFMR:	80009	407-1357-00
						- - - * - - -		
-56	337-2080-00			1		SHIELD,ELEC:TRANSFORMER	80009	337-2080-00
-57	255-0439-00			FT		TUBING,PLASTIC:0.187ID X 0.372"OD,AS/REQ	80009	255-0439-00
-58	361-0571-00			1		SPACER,XFMR:	80009	361-0571-00
						(ATTACHING PARTS)		
-59	212-0518-00			2		SCREW,MACHINE:10-32 X 0.312 INCH,PNH STL	83385	OBD
-60	210-0009-00			2		WASHER,LOCK:EXT,0.193ID X0.40" OD,STL	78189	1110-00
						- - - * - - -		
-61	----- -----			1		CAPACITOR:(SEE C8493 EPL)		
						(ATTACHING PARTS)		
-62	212-0518-00			4		SCREW,MACHINE:10-32 X 0.312 INCH,PNH STL	83385	OBD
-63	210-0206-00			2		TERMINAL,LUG:SE #10	86928	A373-147-1
						- - - * - - -		
-64	386-2650-01			1		STIFFNER,CHAS:RIGHT	80009	386-2650-01
						(ATTACHING PARTS)		
-65	211-0565-00			5		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-66	211-0538-00			2		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-67	----- -----			1		CKT BOARD ASSY:INPUT/SYNC(SEE A2 EPL)		
						(ATTACHING PARTS)		
-68	211-0008-00			6		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-69	136-0269-02			8		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C95140
-70	136-0260-02			1		. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	82647	C9316-18
-71	136-0220-00			69		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
-72	214-0579-00			20		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
-73	131-0993-00			4		. LINK,TERM.CONNE:2 WIRE BLACK	00779	530153-2
-74	131-0589-00			44		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-75	136-0514-00			2		. SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	82647	C93-08-18
-76	202-0196-00			1		. SHIELD,ELEC:ALUMINUM	0000G	OBD
-77	----- -----			1		CKT BOARD ASSY:NTSC DECODER(SEE A3-1 EPL)		
						(ATTACHING PARTS)		
-78	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-79	136-0514-00			8		. SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	82647	C93-08-18
-80	352-0096-00	B010100	B020630	2		. CLIP,SPR,TNSN:CRYSTAL	80009	352-0096-00
	352-0096-00	B020631		1		. CLIP,SPR,TNSN:CRYSTAL	80009	352-0096-00
-81	136-0234-00			2		. SOCKET,PIN TERM:0.088 OD X 0.247 INCH L	00779	380598-1
-82	136-0241-00			2		. SOCKET,PLUG-IN:10 CONTACT,ROUND	71785	133-99-12-064
-83	136-0220-00			46		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
-84	214-0579-00			17		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
-85	131-0589-00	B010100	B020630	47		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
	131-0589-00	B020631		49		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-86	337-1417-00			2		. SHLD,ELECTRICAL:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-87	131-0993-00			2		. LINK,TERM.CONNE:2 WIRE BLACK	00779	530153-2
-88	136-0269-02			1		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C95140
	136-0674-00	XB020631		2		. SKT,PIN TERM.:FOR 0.048 DIA PIN	00779	1-380758-0

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-	----- -----			1		CKT BOARD ASSY:PAL DECODER(SEE A3-2 EPL)		
	136-0514-00			7		. SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	82647	C93-08-18
	352-0096-00			1		. CLIP,SPR,TNSN:CRYSTAL	80009	352-0096-00
	136-0234-00	B010100	B020614	2		. SOCKET,PIN TERM:0.088 OD X 0.247 INCH L	00779	380598-1
	136-0234-00	B020615		7		. SOCKET,PIN TERM:0.088 OD X 0.247 INCH L	00779	380598-1
	136-0674-00	XB020615		2		. SKT,PIN TERM.:FOR 0.048 DIA PIN	00779	1-380758-0
	136-0241-00			3		. SOCKET,PLUG-IN:10 CONTACT,ROUND	71785	133-99-12-064
	136-0220-00	B010100	B020614	64		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
	136-0220-00	B020615		66		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
	214-0579-00	B010100	B020614	22		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
	214-0579-00	B020615		20		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
	131-0589-00	B010100	B020614	42		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
	131-0589-00	B020615		45		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
	337-1417-00			2		. SHLD,ELECTRICAL:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
	131-0993-00			4		. LINK,TERM.CONNE:2 WIRE BLACK	00779	530153-2
	136-0269-02			2		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C95140
-89	----- -----			1		CKT BOARD ASSY:APERTURE CORRECTOR(SEE A16 EPL)		
						(ATTACHING PARTS)		
-90	211-0008-00			3		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
	----- -----			-		. CKT BOARD ASSY INCLUDES:		
-91	131-0589-00			3		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-92	131-0591-00			18		. CONTACT,ELEC:0.835 INCH LONG	22526	47352
-93	136-0220-00			5		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
-94	136-0260-02			1		. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	82647	C9316-18
	----- -----			1		CKT BOARD ASSY:APERTURE CORRECTOR(SEE A16 EPL)		
						(ATTACHING PARTS)		
	211-0008-00			3		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
	131-0589-00			3		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
	131-0591-00			18		. CONTACT,ELEC:0.835 INCH LONG	22526	47352
	136-0220-00			5		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
	136-0260-02			1		. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	82647	C9316-18
-95	407-1840-00			1		BRACKET,CKT CD:APERTURE CORRECTION	80009	407-1840-00
						(ATTACHING PARTS)		
-96	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-97	211-0542-00			2		SCREW,MACHINE:6-32 X 0.312 INCH,TRH STL	83385	OBD
						- - - * - - -		
-98	210-0202-00			2		TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
						(ATTACHING PARTS FOR EACH)		
-99	213-0044-00			1		SCR,TPG,THD FOR:5-32 X 0.188 INCH,PNH STL	83385	OBD
						- - - * - - -		
-100	343-0213-00			4		CLAMP,LOOP:PRESS MT,PLASTIC	80009	343-0213-00
-101	344-0133-00			6		CLIP,SPR,TNSN:CIRCUIT CARD MOUNTING	80009	344-0133-00
						(ATTACHING PARTS FOR EACH)		
-102	213-0044-00			1		SCR,TPG,THD FOR:5-32 X 0.188 INCH,PNH STL	83385	OBD
						- - - * - - -		
-103	----- -----			1		CKT BOARD ASSY:OUTPUT AMP(SEE A4 EPL)		
						(ATTACHING PARTS)		
-104	211-0008-00			4		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-105	131-0589-00			2		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-106	136-0220-00			26		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
-107	136-0514-00			3		. SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	82647	C93-08-18
-108	214-0579-00			10		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
-109	214-0668-00			6		. HEAT SINK,ELEC:FOR TO-5	13103	2211B
-110	136-0269-02			2		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C95140
-111	----- -----			1		CKT BOARD ASSY:LV POWER SUPPLY(SEE A9 EPL)		
						(ATTACHING PARTS)		
-112	210-0407-00			2		. NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
-113	166-0037-00			2		. SPACER,SLEEVE:0.180ID X 0.250D X 0.56" LG	80009	166-0037-00
-114	211-0511-00			3		. SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-115	136-0338-00			3		. SOCKET,TERM.PIN:FOR 0.026 INCH DIA PIN	00779	1-332075-5
-116	131-0589-00			55		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-117	136-0252-04			15		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-118	136-0269-02			2		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C95140
-119	214-0579-00			16		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
-120	210-0202-00			2		TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
						(ATTACHING PARTS FOR EACH)		
-121	213-0044-00			1		SCR,TPG,THD FOR:5-32 X 0.188 INCH,PNH STL	83385	OBD
						- - - * - - -		
-122	361-0431-00			3		SPACER,SLEEVE:6-32 X 0.50 ODX0.73 INCH L	80009	361-0431-00
						(ATTACHING PARTS FOR EACH)		
-123	211-0542-00			1		SCREW,MACHINE:6-32 X 0.312 INCH,TRH STL	83385	OBD
						- - - * - - -		
-124	432-0048-00			2		BASE,CAP.MTG:GENERAL	80009	432-0048-00
						(ATTACHING PARTS FOR EACH)		
-125	211-0016-00			2		SCREW,MACHINE:4-40 X 0.625 INCH,PNH STL	83385	OBD
						- - - * - - -		
-126	343-0089-00			6		CLAMP,LOOP:LARGE	80009	343-0089-00
-127	348-0115-00			2		GROMMET,PLASTIC:U-SHP,0.548 X0.462 INCH	80009	348-0115-00
-128	348-0141-00			4		GROMMET,PLASTIC:U-SHP,0.625 X0.658 INCH	80009	348-0141-00
-129	348-0253-00			2		GROMMET,PLASTIC:1.24 X 0.739 X 0.108" OA	80009	348-0253-00
-130	003-0728-00			1		AD RMV TOOL:PLASTIC U-SHAPE	80009	003-0728-00
						(ATTACHING PARTS)		
-131	211-0514-00			1		SCREW,MACHINE:6-32 X 0.750 INCH,PNH STL	83385	OBD
						- - - * - - -		
-132	441-1144-01			1		CHASSIS,MONITOR:DEFLECTION,RIGHT	80009	441-1144-01
						(ATTACHING PARTS)		
-133	211-0565-00			12		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-134	210-0803-00			6		WASHER,FLAT:0.15 ID X 0.032 THK,STL CD PL	12327	OBD
						- - - * - - -		
-135	441-1145-00			1		CHASSIS,MONITOR:DEFLECTION,LEFT	80009	441-1145-00
						(ATTACHING PARTS)		
-136	211-0565-00			12		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-137	210-0803-00			6		WASHER,FLAT:0.15 ID X 0.032 THK,STL CD PL	12327	OBD
						- - - * - - -		
-138	343-0213-00			1		CLAMP,LOOP:PRESS MT,PLASTIC	80009	343-0213-00
-139	441-1143-00			1		CHASSIS,MONITOR:POWER SUPPLY	80009	441-1143-00
-140	----- -----			1		CKT BOARD ASSY:MATRIX(SEE A14 671 AND 672 EPL)		
-141	131-0589-00			8		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-142	136-0220-00			4		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
-143	131-0621-00			10		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-144	352-0199-00			1		. CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0199-00
-145	352-0203-00			1		. HLDR,TERM CONN:7 WIRE BLACK	80009	352-0203-00


A5
A4
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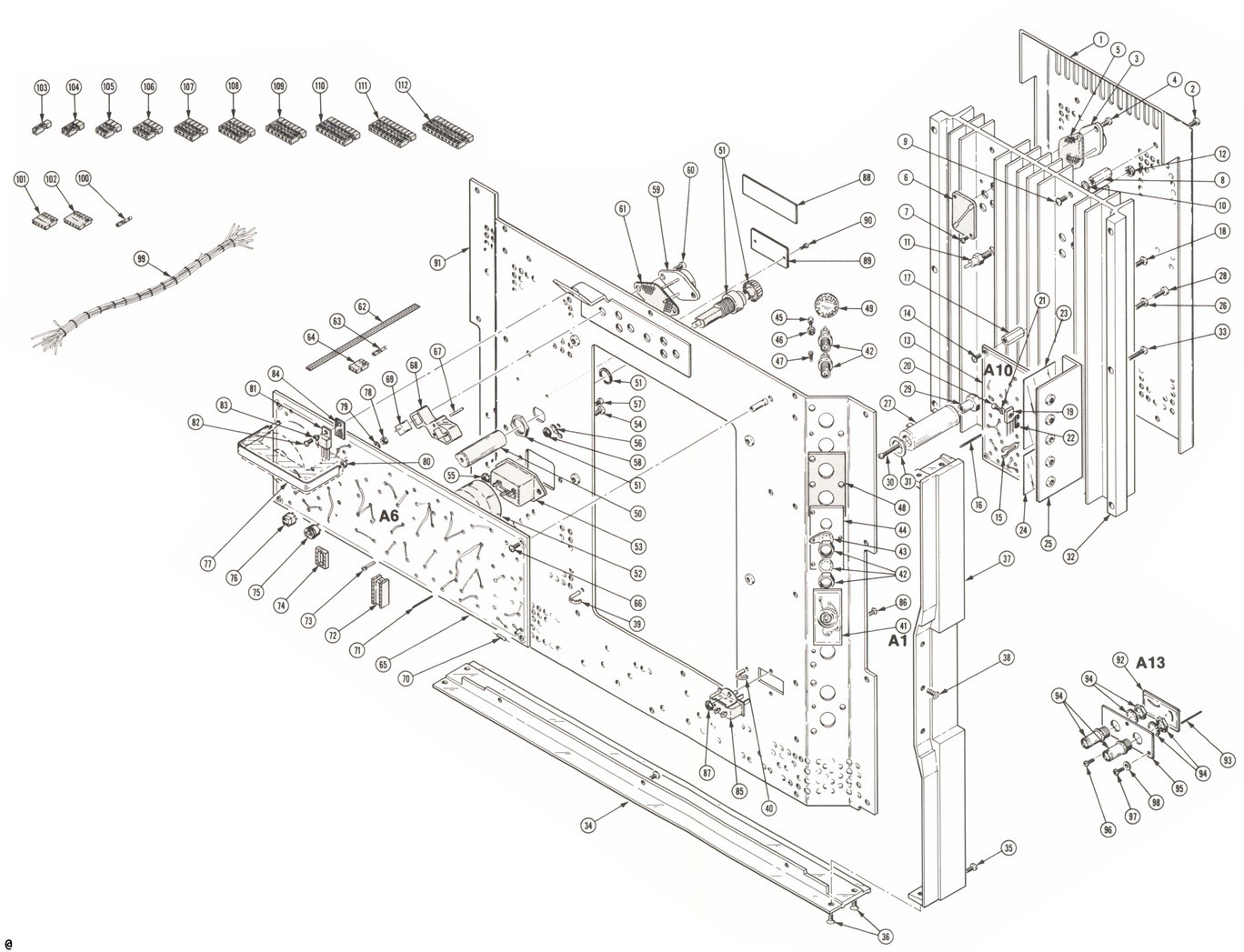
A3–2
A16
A14

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-1	378-0818-00			1		HOUSING,AIR FLO:DUCT	80009	378-0818-00
						(ATTACHING PARTS)		
-2	211-0565-00			4		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
						- - - * - - -		
-3	----- -----			3		TRANSISTOR:(SEE Q8801,Q8891,AND Q8929 EPL)		
						(ATTACHING PARTS FOR EACH)		
-4	213-0183-00			2		SCR,TPG,THD FOR:6-20 X 0.5 TYPE B,PNH,STL	83385	OBD
-5	386-0978-00			1		INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0978-00
						- - - * - - -		
-6	136-0280-00			3		SOCKET,PLUG-IN:FOR TO-3 FOR TO-3	97913	LST 2202-2
						(ATTACHING PARTS FOR EACH)		
-7	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-8	385-0146-00			4		SPACER,POST:0.688 L W/6-32 THD EA END,AL	80009	385-0146-00
						(ATTACHING PARTS FOR EACH)		
-9	211-0565-00			1		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-10	210-0006-00			1		WASHER,LOCK:#6 INTL,0.018THK,STL CD PL	78189	1206-00-00-0541C
						- - - * - - -		
-11	----- -----			1		DIODE:(SEE VR8909 EPL)		
						(ATTACHING PARTS)		
-12	220-0410-00			1		NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	OBD
						- - - * - - -		
-13	----- -----			1		CKT BOARD ASSY:LV HEATSINK(SEE A10 EPL)		
						(ATTACHING PARTS)		
-14	211-0504-00			2		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-15	344-0154-00			4		. CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
-16	131-0589-00			13		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-17	385-0146-00			2		SPACER,POST:0.688 L W/6-32 THD EA END,AL	80009	385-0146-00
						(ATTACHING PARTS FOR EACH)		
-18	211-0542-00			1		SCREW,MACHINE:6-32 X 0.312 INCH,TRH STL	83385	OBD
						- - - * - - -		
-19	----- -----			5		TRANSISTOR:(SEE Q8861,8881,8821,8841,8831 EPL)		
						(ATTACHING PARTS FOR EACH)		
-20	211-0214-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,TRH STL	83385	OBD
-21	210-1122-00			1		WASHER,LOCK:0.228 ID X 0.375 INCH OD,STL	04713	B52200F006
-22	342-0163-00			1		INSULATOR,PLATE:XSTR,0.675 X 0.625 X 0.001"	80009	342-0163-00
						- - - * - - -		
-23	342-0233-00			1		INSULATOR PLATE:MYLAR,1.3 X 0.9 INCH	13103	OBD
-24	342-0234-00			1		INSULATOR PLATE:MYLAR,2.0 X 0.9 INCH	13103	OBD
-25	407-1332-00			1		BRACKET,ANGLE:TRANSISTOR	80009	407-1332-00
						(ATTACHING PARTS)		
-26	211-0542-00			2		SCREW,MACHINE:6-32 X 0.312 INCH,TRH STL	83385	OBD
						- - - * - - -		
-27	----- -----			1		RESISTOR:(SEE R8935 EPL)		
						(ATTACHING PARTS)		
-28	212-0004-00			1		SCREW,MACHINE:8-32 X 0.312 INCH,PNH STL	83385	OBD
-29	210-0462-00			1		INSERT,SCR THD:SHOULDERED,0.719 INCH LONG	80009	210-0462-00
-30	212-0037-00			1		SCREW,MACHINE:8-32 X 1.75 INCH,FILH,STL	83385	OBD
-31	210-0808-00			1		EYELET,METALLIC:CENTERING	63743	2515113-3TP-909
						- - - * - - -		
-32	214-1884-00			1		HEATSINK,ELEC:	80009	214-1884-00
						(ATTACHING PARTS)		
-33	211-0514-00			6		SCREW,MACHINE:6-32 X 0.750 INCH,PNH STL	83385	OBD
						- - - * - - -		
-34	426-1016-00			2		FRAME SECTION:TOP BOTTOM REAR	80009	426-1016-00
						(ATTACHING PARTS FOR EACH)		
-35	211-0565-00			3		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-36	212-0040-00			4		SCREW,MACHINE:8-32 X 0.375 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-37	426-1020-01			2		FRAME SECTION:REAR,UPRIGHT RIGHT AND LEFT	80009	426-1020-01
						(ATTACHING PARTS FOR EACH)		
-38	211-0565-00			4		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-39	343-0089-00			4		CLAMP,LOOP:LARGE	80009	343-0089-00
-40	343-0213-00			2		CLAMP,LOOP:PRESS MT,PLASTIC	80009	343-0213-00
-41	----- -----			4		CKT BOARD ASSY:INPUT LOOP(SEE A1 EPL)		
-42	131-0955-00			8		CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	13511	31-279
-43	210-0255-00			4		TERMINAL,LUG:0.391" ID INT TOOTH	80009	210-0255-00
-44	386-2025-00			4		PLATE,CONN MTG:ALUMINUM	80009	386-2025-00
						(ATTACHING PARTS FOR EACH)		
-45	211-0071-00			3		SCREW,MACHINE:4-40 X 0.375 INCH,TRH,STL	83385	OBD
-46	210-1140-00			3		WSHR,SHOULDERED:0.115 ID X 0.375 INCH OD	80009	210-1140-00
-47	211-0033-00			1		SCR,ASSEM WSHR:4-40 X 0.312 PNH,STL,CD PL	83385	OBD
-48	342-0097-00			1		INSULATOR,PLATE:BNC	93410	OBD
						- - - * - - -		
-49	134-0138-00			2		BUTTON,PLUG:SNAP-IN	77132	SS48172
-50	200-0237-00			1		INS HOOD,INS:FUSEHOLDER	80009	200-0237-00
-51	352-0362-00			1		FUSEHOLDER: W/MOUNTING HARDWARE	75915	345001
-52	200-1681-00	B010100	B020449	1		COV,PROTECTIVE:1.0 ID X 1.0 INCH LONG	99017	237901HB
	200-2116-00	B020450		1		CAP.,PROTECTIVE:	95760	(1377-5)
-53	131-1084-00			1		CONNECTOR,RCPT,:3 BLADE,6A,250V	82389	EAC-302
						(ATTACHING PARTS)		
-54	211-0565-00			2		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-55	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-56	210-0202-00			1		TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
						(ATTACHING PARTS)		
-57	211-0565-00			1		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-58	210-0457-00			1		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-59	----- -----			2		TRANSISTOR:(SEE Q6477 Q6679 EPL)		
						(ATTACHING PARTS FOR EACH)		
-60	211-0511-00			1		SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
-61	386-0978-00			1		INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0978-00
						- - - * - - -		
-62	175-0826-00			FT		WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-63	131-0621-00			3		CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-64	352-0199-00			1		CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0199-00
-65	----- -----			1		CKT BOARD ASSY:KINE SUPPLY(SEE A6 EPL)		
						(ATTACHING PARTS)		
-66	211-0008-00			4		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-67	136-0384-00			4		. SOCKET,PIN TERM:FOR 0.04 DIAMETER PIN	00779	52120
-68	136-0361-00			2		. SPACER,XSTR:	80009	136-0361-00
-69	131-0847-00			4		. TERMINAL STUD:6-32 X 0.435 INCH LONG	80009	131-0847-00
-70	131-0566-00	B010100	B029999X	1		. LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-71	131-0589-00	B010100	B029999	26		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
	131-0589-00	B030000		28		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-72	136-0269-02			1		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C95140
-73	214-0579-00	B010100	B029999	5		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
	214-0579-00	B030000		10		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
-74	136-0514-00			2		. SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	82647	C93-08-18
-75	136-0220-00			7		. SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
-76	136-0183-00			2		. SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
-77	346-0010-00			1		. BAND,RETAINING:	80009	346-0010-00
						(ATTACHING PARTS)		
-78	210-0586-00			2		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
-79	210-0994-00			2		. WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5714-147-20N
-80	210-0406-00			2		. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
						- - - * - - -		
-81	----- -----			1		. TRANSISTOR:(SEE Q6481 EPL)		
						(ATTACHING PARTS)		
-82	211-0214-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,TRH STL	83385	OBD
-83	210-1178-00	B020150		1		WSHR,SHOULDERED:FOR MTG TO-220 TRANSISTOR	49671	DF 137A
	210-1171-00	B010100	B010149	1		WSHER,SHOULDERED:0.116 ID X 0.138 INCH OD	52905	A7148516P2
-84	342-0163-00			1		INSULATOR,PLATE:XSTR,0.675 X 0.625 X 0.001"	80009	342-0163-00
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-85	136-0473-01			1		CONNECTOR,RCPT,:3 CONTACT,POLARIZED	71785	P303-AB
						(ATTACHING PARTS)		
-86	211-0214-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,TRH STL	83385	OBD
-87	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-88	334-2541-00			1		MARKER,IDENT:DHGW STANDARDS	80009	334-2541-00
-89	334-0904-00			1		PLATE,INSTR:	80009	334-0904-00
						(ATTACHING PARTS)		
-90	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-91	386-2542-00			1		PANEL,REAR:	80009	386-2542-00
-92	----- -----			1		CKT BOARD ASSY:R-Y/B-Y OUTPUT(SEE A13 EPL)		
-93	131-0589-00			5		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-94	131-0955-00			2		CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	13511	31-279
-95	386-2025-00			1		PLATE,CONN MTG:ALUMINUM	80009	386-2025-00
						(ATTACHING PARTS)		
-96	211-0033-00			3		SCR,ASSEM WSHR:4-40 X 0.312 PNH,STL,CD PL	83385	OBD
-97	211-0071-00			3		SCREW,MACHINE:4-40 X 0.375 INCH,TRH,STL	83385	OBD
-98	210-1140-00			1		WSHR,SHOULDERED:0.115 ID X 0.375 INCH OD	80009	210-1140-00
						- - - * - - -		
-99	179-2029-01	B010100	B029999	1		WIRING HARNESS,:MAIN CHASSIS	80009	179-2029-01
	179-2029-02	B030000		1		WIRING HARNESS,:MAIN CHASSIS	80009	179-2029-02
-100	131-0792-01			1		. CONTACT,ELEC:0.577"L,18-20AWG WIRE	22526	46221
	131-0621-00			189		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
	131-0622-00			25		. CONTACT,ELEC:0.577"L,28-32 AWG WIRE	22526	46241
	131-0707-00			28		. CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-101	352-0163-00			2		. CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0163-00
-102	352-0164-00			3		. CONN BODY,PL,EL:6 WIRE BLACK	80009	352-0164-00
-103	352-0197-00			3		. CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0197-00
-104	352-0198-00			2		. HLDR,TERM CONN:2 WIRE BLACK	80009	352-0198-00
-105	352-0199-00			5		. CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0199-00
-106	352-0200-00			9		. HLDR,TERM CONN:4 WIRE BLACK	80009	352-0200-00
	352-0200-03			1		. HLDR,TERM CONN:4 WIRE ORANGE	80009	352-0200-03
-107	352-0201-00			2		. CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0201-00
	352-0201-02			1		. CONN BODY,PL,EL:5 WIRE RED	80009	352-0201-02
	352-0201-04			1		. CONN BODY,PL,EL:5 WIRE YELLOW	80009	352-0201-04
-108	352-0202-00			5		. HLDR,TERM CONN:6 WIRE BLACK	80009	352-0202-00
-109	352-0203-00			3		. HLDR,TERM CONN:7 WIRE BLACK	80009	352-0203-00
-110	352-0204-00			3		. CONN BODY,PL,EL:8 WIRE BLACK	80009	352-0204-00
-111	352-0205-00			2		. CONN BODY,PL,EL:9 WIRE BLACK	80009	352-0205-00
	352-0205-01			2		. CONN BODY,PL,EL:9 WIRE BROWN	80009	352-0205-01
	352-0205-02			1		. CONN BODY,PL,EL:9 WIRE RED	80009	352-0205-02
	352-0205-03			1		. CONN BODY,PL,EL:9 WIRE ORANGE	80009	352-0205-03
	352-0205-04			1		. CONN BODY,PL,EL:9 WIRE YELLOW	80009	352-0205-04
-112	352-0206-00			4		. HLDR,TERM CONN:10 WIRE BLACK	80009	352-0206-00
	179-2030-00			1		WIRING HARNESS,:AC	80009	179-2030-00
	131-0621-00			4		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
	352-0198-00			2		. HLDR,TERM CONN:2 WIRE BLACK	80009	352-0198-00
	179-2031-00			1		WIRING HARNESS,:L.V. HEAT SINK	80009	179-2031-00


A6
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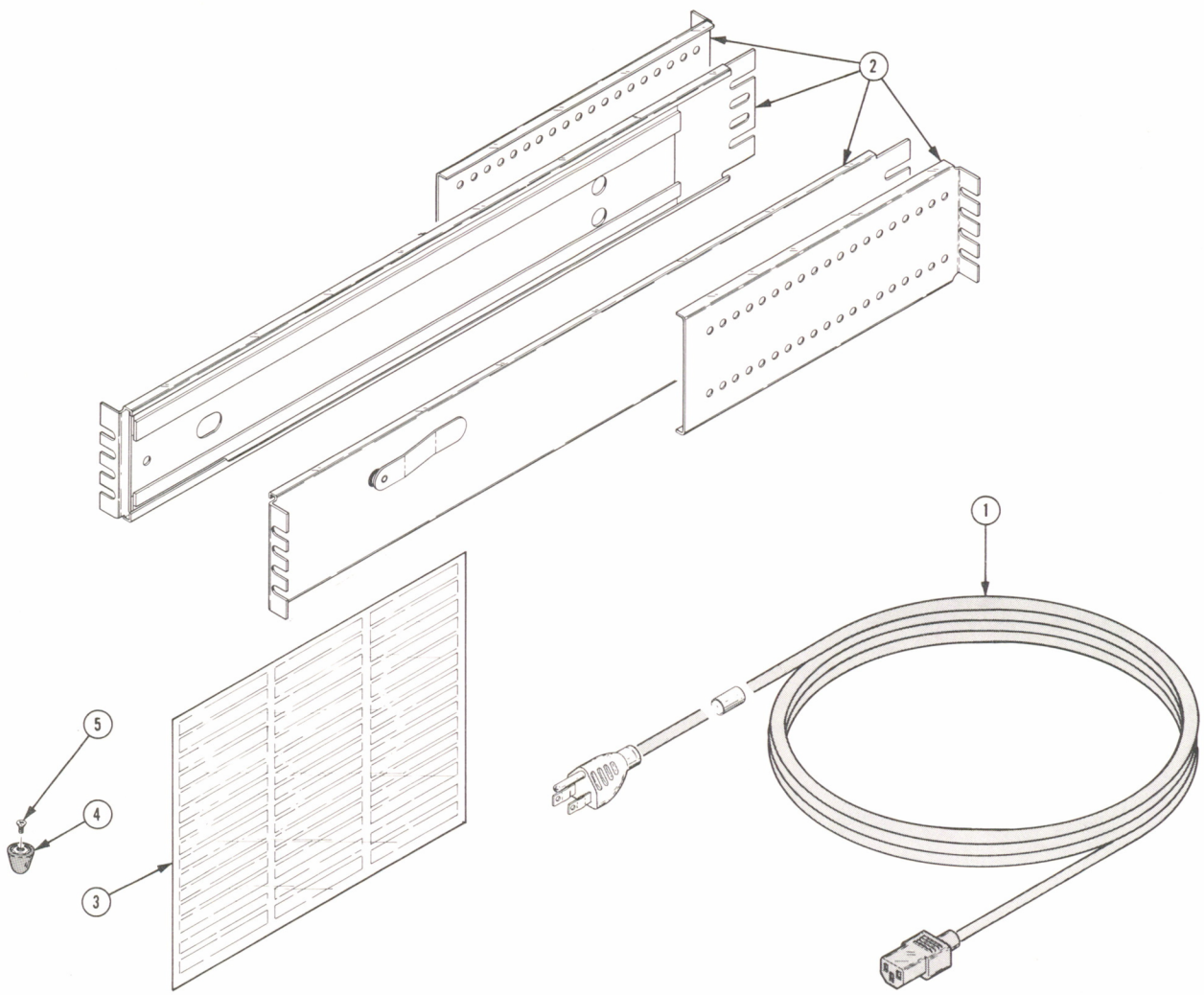

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-1	161-0066-00			1		CABLE ASSY,PWR:3 WIRE,98 INCHES LONG	80009	161-0066-00
-2	351-0395-00			1		SLIDE GUIDE:PAIR	80009	351-0395-00
-3	334-1935-00			1		LABEL SET:TALLY IDENTIFICATION	80009	334-1935-00
-4	348-0080-01			4		FOOT:PLASTIC	80009	348-0080-01
-5	211-0538-00			4		SCREW,MACHINE:6-32 X 0.312" 100 DEG,FLH STL	83385	OBD
	070-2201-01			1		MANUAL,TECH:SERVICE	80009	070-2201-01

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.

SERVICE NOTE

Because of the universal parts procurement problem, some electrical parts in your instrument may be different from those described in the Replaceable Electrical Parts List. The parts used will in no way alter or compromise the performance or reliability of this instrument. They are installed when necessary to ensure prompt delivery to the customer. Order replacement parts from the Replaceable Electrical Parts List.

CALIBRATION TEST EQUIPMENT REPLACEMENT

Calibration Test Equipment Chart

This chart compares TM 500 product performance to that of older Tektronix equipment. Only those characteristics where significant specification differences occur, are listed. In some cases the new instrument may not be a total functional replacement. Additional support instrumentation may be needed or a change in calibration procedure may be necessary.

Comparison of Main Characteristics

DM 501 replaces 7D13		
PG 501 replaces 107	PG 501 - Risetime less than 3.5 ns into 50 Ω.	107 - Risetime less than 3.0 ns into 50 Ω.
108	PG 501 - 5 V output pulse; 3.5 ns Risetime	108 - 10 V output pulse 1 ns Risetime
PG 502 replaces 107		
108	PG 502 - 5 V output	108 - 10 V output
111	PG 502 - Risetime less than 1 ns; 10 ns Pretrigger pulse delay	111 - Risetime 0.5 ns; 30 to 250 ns Pretrigger pulse delay
PG 508 replaces 114	Performance of replacement equipment is the same or better than equipment being replaced.	
115		
2101		
PG 506 replaces 106	PG 506 - Positive-going trigger output signal at least 1 V; High Amplitude output, 60 V.	106 - Positive and Negative-going trigger output signal, 50 ns and 1 V; High Amplitude output, 100 V.
067-0502-01	PG 506 - Does not have chopped feature.	0502-01 - Comparator output can be alternately chopped to a reference voltage.
SG 503 replaces 190, 190A, 190B	SG 503 - Amplitude range 5 mV to 5.5 V p-p.	190B - Amplitude range 40 mV to 10 V p-p.
191		
067-0532-01	SG 503 - Frequency range 250 kHz to 250 MHz.	0532-01 - Frequency range 65 MHz to 500 MHz.
SG 504 replaces 067-0532-01	SG 504 - Frequency range 245 MHz to 1050 MHz.	0532-01 - Frequency range 65 MHz to 500 MHz.
067-0650-00		
TG 501 replaces 180, 180A	TG 501 - Trigger output-slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	180A - Trigger pulses 1, 10, 100 Hz; 1, 10, and 100 kHz. Multiple time-marks can be generated simultaneously.
181		181 - Multiple time-marks
184	TG 501 - Trigger output-slaved to market output from 5 sec through 100 ns. One time-mark can be generated at a time.	184 - Separate trigger pulses of 1 and 0.1 sec; 10, 1, and 0.1 ms; 10 and 1 μs.
2901	TG 501 - Trigger output-slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	2901 - Separate trigger pulses, from 5 sec to 0.1 μs. Multiple time-marks can be generated simultaneously.

NOTE: All TM 500 generator outputs are short-proof. All TM 500 plug-in instruments require TM 500-Series Power Module.

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committed to technical excellence

MANUAL CHANGE INFORMATION

PRODUCT 670A & 671A
070-2201-01

CHANGE REFERENCE C9/778
DATE 7-20-78 CTV 0346

CHANGE:	DESCRIPTION

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

Change LV POWER SUPPLY (Diagram 15) and ADD to the ELECTRICAL PARTS LIST (page 9-17) as follows:

F8987[5]	159-0003-00	FUSE,CARTRIDGE:3AG,1.6A,250V,MEDIUM BLOW SN B030785 and up

MANUAL CORRECTIONS
(for Page 9-17)

F8987[4]	159-0015-00	FUSE,CARTRIDGE:3AG,3A,250V,FAST-BLOW
F8987[5]	159-0016-00	FUSE,CARTRIDGE:3AG,1.5A,250V,FAST-BLOW SN B010100 to B030784

[4]For 115 Vac mains.

[5]For 230 Vac mains.